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THE UNIVERSITY OF ALBERTA

COGNITIVE-ECOLOGICAL STRUCTURE AND PERSONALITY TYPES

by

LYNN SEREDA

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

OCTOBER 1966

THE UNIVERSITY OF ALABAMA

DEPARTMENT OF EDUCATION AND HUMAN SERVICES

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AND PERSONALITY TYPES", SUBMITTED BY LYNN
SEREDA IN PARTIAL FULFILMENT OF THE RE-
QUIREMENT FOR THE DEGREE OF MASTER OF
EDUCATION.

ABSTRACT

This study has undertaken to measure the symbolic meaning structure of two dimensionally opposite personality types: introverts - extraverts. The Myers-Briggs Type Indicator was chosen as a means of obtaining samples differing on the introversion-extraversion dimension.

A total of 164 summer school students in a senior educational psychology course completed the Myers-Briggs. The 50 subjects with most extreme scores in each direction who had successfully completed an association test were chosen for further analysis.

An association test sampling concepts from different ecological or environmental areas was prepared, administered and scored according to Deese's (1962) procedures for obtaining an overlap coefficient. The overlap coefficient is a measure of relation, showing the extent of common responses between a pair of stimulus words.

The matrices for both samples were factor analyzed and rotated by a varimax criterion. Factors were compared across samples by means of the coefficient of congruence as outlined in Harmon (1960), and further, common factors were analyzed for differences to aid in the clarification of conceptual structure differences between introverts and extraverts.

The results indicated that the factors are basically comparable, 9 out of 10 coefficients of congruence fall above the criterion.

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The results indicated that the factors are basically comparable. 9 out of 10 coefficients of congruence fall above the criterion.

ion of .800. Further it was possible to name the factors on the basis of the initial classification of stimulus or ecological areas with very few inappropriate loadings.

The results did not demonstrate that words classified on an a priori basis as internal, have larger factor coefficients on factors classified as representing the internal ecology. Similarly the results did not demonstrate that words classified on an a priori basis as external, have larger factor coefficients on factors classified as representing the external ecology.

What was demonstrated, however, was that when the direction of the difference is ignored, words a priori classified as either internal or external, when matched with a congruent factor, i.e. (internal word x internal factor, or, external word x external factor) tend to be the best discriminators of associational differences for the factor.

Finally a couple of possible incongruences with introversion-extraversion theory seemed to emerge in the comparisons of factor differences across samples. The first is that introverts seem to be much more internal gut response and cortical desynchronization oriented than might have been predicted. The second is that extraverts tend to be somewhat more study and thought oriented, than might have been predicted. However, it may be that for extraverts studying is more people oriented, which seems more in line with an extraverted conception of study.

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Finally a couple of possible incongruities with inversion-extraversion theory seemed to emerge in the comparison of factor differences across samples. The first is that introverts seem to be much more internal and extrinsic than extraverts. The second is that extraverts tend to be somewhat more study and thought oriented, than introverts might have been predicted. However, it may be that for extraverts studying is more people oriented, which seems more in line with an extraverted conception of study.

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CHAPTER I

INTRODUCTION

Theoretical Background and the Problem

The role of stimuli as they effect behavior has always been a central problem in the history of psychology. In the past, major behavior theorists have always dealt with a single stimulus in their models. It seems strange that few have attempted to deal with the problem of handling groups of stimuli simultaneously in a dimensional model.

A number of psychologists have continued to emphasize the importance of stimulation upon behavior despite the increasing emphasis on central cognitive and general organismic processes in behavior. Some of the more prominent of them being the Gibsons of the experimental perception group, Heider of the ego psychology group and Barker of the social psychology group.

Further, in at least two behavior theories where the major orientation is considered central process or cognitive, those of Osgood (1957) and Sarbin, Taft and Bailey (1960), the importance of stimulus dimensionality in the prediction of behavior has been raised. In both cases the description of cognitive structure becomes the means to that end.

Osgood's theoretical orientation emphasizes the behavioral response or reaction to entity or stimulus as defining meaning in a behavioral sense. What have emerged are the now very familiar evaluative, activity and potency dimensions which are in effect, very likely adequate descriptions of behavioral responses to stimuli.

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However, for the purposes of this work the writer was more interested in the entity or the ecological object itself, the so-called thing, and its symbolic counterpart, the noun. The importance of dealing with entities stems from the basic orientation that stimuli (entities) are the primary effectors of behavior. For this reason the study is focused mainly on the theoretical orientation of Sarbin, Taft and Bailey. Of further consideration is the attempt in their work to bridge the gap between the stimulus theorists and the more cognitively oriented approaches to behavior. The bridge is in the form of a simple posited relation between cognitive structure and ecological structure that can best be described in their own words (1960).

"The person is functionally dependent on the achievement of cognitive organizations proportional to the ecological organizations. That is, to satisfy functional (survival) requirements his cognitive organization must be reasonably proportional to those organizations in the ecology." If this fundamental proposition is accepted it is reasonable to suppose that accurate descriptions of the ecology can be arrived at through the study of cognitive structures. Indeed it would be difficult to demonstrate otherwise, although it shall always remain an open question as to the extent proportionality can effectively be achieved, especially in view of more recent considerations on the relative nature of structure.

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Further, it has been argued that we develop symbolically in a direction of increasing differentiation and integration (Werner and Kaplan 1963) in those ecological areas to which our attention is directed. Our cognitive representational structure is likely to be more differentiated in certain ecological areas. Individuals can be expected to differ in the ecological areas that they consistently or habitually attend to and these differences should be reflected in cognitive structure. Measures of differences in cognitive structure would seem to hold interesting possibilities for the differentiation of personality types and for the eventual prediction of behavior.

The problem largely becomes one of reducing ecological or cognitive organizations to some manageable proportions. For these purposes I have chosen a dimensional model. Again from Sarbin, Taft and Bailey (1960) who have addressed themselves to the problem in the following manner: "We have tried to make clear that the ecology may be analyzed into dimensions and that dimensions are ways of ordering characteristics of occurrences. We must further emphasize that dimensions of the ecology are mathematical-statistical arrangements. An object does not "possess" a dimension rather it has such and such a dimensional value, or falls at some given place on the dimension as measured (or rated). If more than one dimension is involved it falls at a point within the coordinate space defined by the dimensions. When we say that an object, human or otherwise, has such and such characteristics we mean that it can be placed at certain points on the various named dimensions. Perhaps the best

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way of thinking of the cognitive organization is that of a hyperspace with an indeterminate number of dimensions. A region within the space determined by coordinate values on intersecting dimensions cognitively represents an ecological object when the dimensions are, so to speak, in the head." Such a cognitive counterpart of the objects in the ecology is called a module by said authors.

Dimensionality can be imposed upon any system of objects occupying a common space in which the relation between the objects is specified in some quantitative sense. The shortcoming of such an approach lies in the determination of common space. For example, the space chosen by Rokeach (1960) was one of cognitive attitude, that of Osgood (1957) one of descriptive response, and for purposes of this study the space of the ecological object. Is it not surprising that the dimensions are not comparable; they are not intended to be.

The problem of determining meaningful ecological dimensions looms even larger for once an area of attention has been specified there continue to be problems in determining the appropriate variables to be studied within the area and then of measuring these variables.

Since this study is not so much concerned with a complete objective determination of the major ecological dimensions of objects as in demonstrating the possibility of such an approach as a means of reflecting personality differences, it was decided to suggest four major, highly general ecological areas on an a priori basis. The areas chosen were those of external natural stimuli, external

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four major, highly general ecological areas on an a priori basis.

The areas chosen were those of external natural stimuli, external

coded stimuli, internal natural stimuli and internal coded stimuli. The rationale underlying the above choices will be expanded upon in the following chapter.

Purposes of the Study

The objective of this study is to measure the symbolic-ecological structure of two extremely differing personality types introverts - extraverts. This symbolic-ecological structure matrix will be determined in Euclidean space and will then be reduced by means of factor analysis. Comparisons will then be made across samples.

The major purpose of the study is to attempt to show that there are meaningful clusters of stimulus words that resemble environmental-ecological stimulus areas, chosen on an a priori basis, and that these symbolic-ecological structures are basically constant across personality types. It is a further purpose of this study to demonstrate that where differences do occur across these basically stable dimensions they will be in directions predicted from the initial classifications of these chosen words or in directions predicted from the emerging factors classified as internal or external. In other words it is expected that common dimensions will emerge for the two samples and that these dimensions will be reflective of the pre-chosen stimulus areas. Where specific differences do occur on common factors across samples it is hoped that these differences will aid in the understanding of the differentiation of these person-

coded stimuli, internal natural stimuli and internal coded stimuli. The rationale underlying the above choices will be expanded upon in the following chapter.

Purposes of the Study

The objective of this study is to measure the symbolic-ecological structure of two extremely differing personality types in response - extraverts. This symbolic-ecological structure matrix will be determined in multidimensional space and will then be reduced by means of factor analysis. Comparisons will then be made across samples.

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Hypotheses to be Tested

The nature of the design made certain limitations inevitable in the way of hypothesis testing, such that it is virtually impossible to state categorically on any probability basis whether to accept or reject the hypothesis.

Hypothesis I. Matrix reduction (factor analysis-principal components solution-varimax rotation) of an inter-associated set of words will result in basically comparable factors (coefficient of congruence) for two separate samples independently differentiated as to personality types (introverts-extraverts).

Hypothesis II. Resulting factors should basically resemble the sets of stimulus areas (represented by noun symbols) chosen a priori. Minimally it should be possible to differentiate factors on the basis of variables representative of either external stimulus areas or internal stimulus areas.

Hypothesis III. Comparison of factor coefficients across samples for comparable factors will yield noticeable differences on some of the variables. Whenever differences occur they should be basically in directions suggested by type theory. That is for extraverts, variables (words) suggestive of the external ecology should have larger factor coefficients on factors suggestive of a dimension of the external ecology. Similarly for introverts, variables (words) suggestive of the internal ecology should have larger coefficients on factors suggestive of dimensions of the internal ecology.

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Hypothesis to be tested

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Hypothesis I. Matrix reduction (factor analysis-principal

components solution-varimax rotation) of an inter-associated set of words will result in a relatively comparable factor (coefficient of congruence) for two separate samples independently differentiated as to personality types (introverts-extroverts).

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Organization of the Remainder of the Study

In Chapter II, a review of literature relevant to the present study, focusing on both theoretical concepts and research in the areas of cognitive-symbolic structure and personality types are presented. Also research data related to the measuring instruments utilized by this study is presented. Finally, an attempt is made to relate the implications of the foregoing research presentation to the rationale of the present research design.

Chapter III is concerned with the design and methodology of this study. Sources of data, their collection, and the statistical treatment of the data are discussed.

The findings and conclusions of the study, based upon the data obtained are found in Chapter IV. Comparisons are made between those conclusions justifiable in terms of the data, and the initial stated general purposes and specific hypotheses of the study so as to indicate acceptance or rejection where appropriate.

Chapter V presents the implications drawn from the current research for the general educational-psychological goals of measurement of individual differences and behavior prediction.

A copy of the unpublished instrument used in the study is to be found in the Appendix.

Organization of the remainder of the study

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CHAPTER II

REVIEW OF LITERATURE

A. Literature bearing on issues of cognitive structure with particular emphasis on the problem of measurement.

The general question of determining structured characteristics of higher mental processes, in men, has long been a focal point in the study of behavior. The associationist movement in psychology has arisen out of such confrontation. Historically the movement concerned itself with attempts to classify words on the basis of relatedness of meaning.

Recently the question has shifted more in the direction of asking what processes are involved in the construction of meaning and how do these processes contribute to the isomorphic character of symbols and things (the objects of the real world).

To this end various techniques, arising from particular theoretical orientations, have been developed. The central problem of technique is to determine an objective basis for the specification of relations between the elements of mind or rather the specification of the structure of mind.

Sarbin, Taft and Bailey (1960) summarize various techniques which purport to measure such cognitive modular structure. Perhaps the classic work in this field to date has been that of Osgood (1957) and his associates, in their development of the semantic differential. Some of the rationale underlying Osgood's approach has previously been

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referred to. Let it suffice to add that in this approach, the reaction to, or response aspect of behavior, is held to be the major process through which mediated meaning evolves. The actual measurement of the meanings of concepts is accomplished by having a subject rate on a scale from 1 - 7, a dichotomized descriptive reaction to a conceptual object, (or noun). By sampling the widest distribution of descriptive reactions it was then possible to reduce the range of these descriptive reactions to the minimal number of dimensions that would account for the most significant portion of the variance. These dimensions—evaluation, activity and potency - are described as the major dimensions of meaning accounting for over 60% of the descriptive variance.

The rationale for such an approach is based on the tenet that we can come to know the object only via the consistent behavioral response it is capable of effecting by its attributes. Such an approach tends to mask many of the phenomenal characteristics of objects as signs, signs capable of being interrelated as wholes in themselves. In other words it limits the interrelation of objects to prior determined descriptive reactions to the objects.

Contemporaneously another approach was being developed by Kelly (1955) the role construct repertory test. The rationale underlying Kelly's approach is that we construct a relationship with our environment via a symbolic system which defines our role with that environment. We develop pervasive ways or modes of construing, which in a large measure, determine how we will perceive our environment in subsequent encounters. The problem thus becomes one of determining an

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individual's major method of construction. This is accomplished by asking subjects to name a number of important persons in their lives. Subsequently the underlying roles of these persons are compared by a method of triads in order to reduce the number of discriminable roles which the subject utilizes in construing his or her social environment. It is then possible to rate a given set of concepts on these constructs to obtain a matrix of interrelationships.

A third kind of approach has been in terms of traditional paired comparison techniques which yields a matrix of inter-stimulus comparisons. Comparisons may be on scales varying on the degree of differentiation required. Usually the least difficult kind of differentiation, a dichotomous one, is all that is required, e.g. are the stimulus words similar or different in meaning.

Much of what has been done in this area has been in terms of obtaining a matrix of inter-rated concepts on some rated dimension.

Recently Deese (1962) has proposed a somewhat novel method of obtaining a matrix of interword associations. His work represents an out growth from the free association methods first publicized by Freud. Free association was an attempt to probe the inner structure of the ego. What follows is an attempt to trace the development and significance of Deese's proposal.

The general rationale for free association has been that a stimulus word is likely to elicit a response highly related in meaning (particularly in a psychological sense) when complete freedom in choosing the response associate is given. It is essentially this argument

individuals' major method of communication. It is accomplished by asking subjects to name a number of important persons in their lives. Subsequently the underlying roles of these persons are compared by a method of triads in order to reduce the number of distinguishable roles which the subject utilizes in constructing his or her social environment. It is then possible to rate a given set of concepts on these continua to obtain a matrix of interrelationships.

A third kind of approach has been in terms of traditional paired comparison techniques which yields a matrix of interrelationships. Comparisons may be on scales varying on the degree of differentiation required. Usually the least difficult kind of differentiation, a dichotomous one, is all that is required, e.g., are two stimulus words similar or different in meaning.

Much of what has been done in this area has been in terms of obtaining a matrix of inter-rated concepts on some rated dimension. Recently Leese (1962) has proposed a somewhat novel method of obtaining a matrix of interword associations. His work represents an outgrowth from the free association methods first published by Freud. Free association was an attempt to probe the inner structure of the ego. What follows is an attempt to trace the development and significance of Leese's proposal.

The general rationale for free association has been that a stimulus word is likely to elicit a response highly related in meaning (particularly in a psychological sense) when complete freedom in choosing the response associate is given. It is essentially this argument

which forms the basis for the measurement technique used in this design.

One of the earliest objective attempts to measure meaning via free association dates to 1905 when the first Kent-Rosanoff word association norms were published. A number of psychologically significant words (100) were chosen and the frequencies of various response associates to each word were tabulated, for a large population. Presumably the meaning of a word could be determined by a hierarchical arrangement of the frequencies of related response associates. Such a method, however, says very little about the nature of the structural relationships of one stimulus concept to another.

In 1954, the same list of words used in the early Kent-Rosanoff norms were used to obtain new frequency norms (Russel and Jenkins, 1954) with the resultant frequencies and hierarchy remaining much as in the earlier norms.

Very little improvement was made in the way of objectifying the measurement of meaning-structure for the fifty year period following the original Kent-Rosanoff norms. For example, Noble in 1952 suggested an index of meaning, as the mean frequency of continued associations over a 60 second interval. Such an index may reflect breadth or scope in meaning but little else.

In the same year, Jenkins and Russel (1952) demonstrated a significant superiority ($p < .001$) in the recall of paired associates that were highly associated in the Kent-Rosanoff norms, over a list of randomly associated words. Bousfield, W.A. (1953) pursuing the issue further, demonstrated the occurrence of clustering in paired

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of randomly associated words. Townsley, W.A. (1953) pursuing the
issue further, demonstrated the occurrence of clustering in paired

associate learning. The design involved recall learning of 59 randomly presented words that were chosen a priori to be representative of four distinctly different categories. It was found that "subjects tended to cluster their recall items beyond chance expectations".

Jenkins and Cofer (1957) in an attempt to compare differences in effects of stimuli presented separately, against the effects of presenting compound verbal stimuli, developed a mutual frequency score (m.f. score), which was the proportion of responses a pair of stimulus words have in common. The common responses of two stimuli presented separately (as measured by the m.f. score) could then be compared to the responses of the stimuli presented together (compound). The results tended to indicate a wider variation in the responses to compound stimuli.

Deese (1960) used an index which was reflective of the amount of inter association between words comprising tests to be learned for free recall. The index is computed by tabulating the number of times a word occurs as a response to each of the stimulus words. The stimulus and response words must be directly linked. In this way it is possible to generate a matrix of stimulus response inter relations. The analysis of such a matrix of paired associate responses, tends to show that word associations form organized networks of inter relations beyond the level of chance expectations (Bousfield 1953). Deese also was able to produce evidence suggesting that the variation of free recall scores for differing tests could be explained as resulting from differences of interword association for the tests. That is a list with a high index of inter-relation

associative learning. The results involved recall learning of 22 words; presented words that were chosen a priori to be representative of four distinct categories. It was found that subjects tended to cluster their recall items according to these categories. (Tomkins and Joffe (1977) in an attempt to measure differences in effects of stimuli presented separately, against the effects of presenting compound verbal stimuli, developed a method for presenting (M.I. score), which was the proportion of responses a pair of stimuli words have in common. The common responses of two stimuli presented separately (as measured by the M.I. score) would then be compared to the responses of the stimuli presented together (compound). The results tended to indicate a wider variation in the responses to compound stimuli.

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results in higher free recall scores.

Bousfield, Whitmarsh and Berkowitz (1960) addressed themselves to the problem of scoring mutual frequency response (m.f.) in the case where the same word is both stimulus and response (principle diagonal of a matrix). They posited two types of response to a verbal stimulus:

- (a) a distinctive representational response which may be labelled the stimulus word itself, and
- (b) a group of verbal associational responses, the strength of which can be measured by their cultural frequencies as they occur in free associational norms.

In computing the mutual frequency score they suggested that it be a proportion of $2N$, since a stimulus elicits itself as a response N times, N being the number of subjects, as well as eliciting a different possible response N times.

Whitmarsh (1962), in a dissertation study, attempted to compare the predictive value of Osgood's measures of verbal relatedness, against Bousfield et al's measures, on the learning of word lists. It was found that both theories have about the same predictive value, neither one of them being capable of significantly predicting learning in this sense. He suggested that these measures appear to be measuring different aspects of verbal relatedness (intercorrelations and correlation with criterion of learning).

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(S.O.) in recall, which is obtained from presentation of all possible pairs in a word list, and a subsequent recording of the number of times each word appears in each possible recall position. It is then possible to determine the chance expectancy and the varying probabilities of deviation from chance of a given recall pair. Tulving's results demonstrate that organization increases with repetition and that there is a positive relation between organization and performance.

In general the research presented to this point has demonstrated a higher than chance expectancy of interrelationships between words on sequential recall of paired associates. It has tended to point to structure in meaning.

Deese (1962) in an excellent publication on the structure of associative meaning, pulled together much of the earlier work of Bousfield and Jenkins, elaborated on the mutual frequency score and developed what he called an overlap coefficient, as a measure of common associates for a given stimulus pair. The overlap coefficient represents, Deese argues, a significant step forward in the measurement of associates. Previous indices relied on the frequency that a stimulus elicits a given response. Deese points to a limitation in such a measure, in that it eliminates the possibility of reflecting relatedness among words that elicit common response associates but that do not elicit each other. As an example, based on a sample of John Hopkins University undergraduates, it was found that the pair, piano and symphony had many responses in common, e.g., note, song, sound, noise, music and orchestra, in varying frequencies, yet neither

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stimulus word elicited the other as a direct response.

The coefficient proposed by Deese is a measure of the frequency of common responses, that a stimulus pair elicits. More explicitly it represents the ratio of the number of common responses two stimuli have in common, to the maximum number of responses they could have in common; the maximum being two times the number of subjects in the sample. The justification for the denominator being that each stimulus word elicits itself 100% of the time as a response. This solves the problem of what values to place in the principle diagonal (unity). Such an overlap coefficient score can vary from .00 to 1.0 and appears to behave much like a positive correlation coefficient in a factor analytic design.

It is possible to determine the overlap coefficient between each pair of stimulus words in a set, and so obtain a matrix of overlap coefficients.

Deese has further demonstrated that factor analysis of such a matrix, tends to yield a factor structure showing high relationships among words that are common high frequency associates for a given stimulus in the Kent-Rosanoff norms, and low relationships among words not elicited by a common response.

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Deese's measure, the overlap coefficient, and his demonstration of the apparent meaningfulness of the reduction of an overlap coefficient matrix forms the basis for the determination of similar matrices and their reduction in this study.

Strictly speaking the reliability of the overlap coefficient has not been determined. However, the reconstruction of the original Kent-Rosanoff data in the Minnesota norms has demonstrated a high degree of consistency, over approximately a 50 year period, in the kinds of associates a given stimulus is likely to elicit.

There is some reliability data available on a related type of measure of cognitive structure, the role construct measure devised by Kelly. In 1961, Fjeld and Landfield, administered the role construct repertory test to four groups of twenty subjects. The results showed 83% agreement, (sig $p < .001$). Bannister (1961) using the same instrument demonstrated high inter and intra subject consistency in the constructs subjects use to make role judgments.

B. Literature bearing on introversion-extraversion theory and its relation to the apriori position taken on environmental dimensions.

Jung (1923) in his book, "Psychological Types", in describing the general attitude types says: "The introvert's attitude to the object is an abstracting one; at bottom, he is always facing the problem of how libido can be withdrawn from the object, as though an attempted ascendancy on the part of the object had to be continually frustrated."

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H. J. Eysenck, who is presently the leading researcher and theoretician involved in introversion-extraversion theory, has attempted a synthesis between Pavlovian learning theory and personality theory in explaining these types. At a neural level introverts are posited as being very low in cortical inhibition while extraverts are very high in cortical inhibition. There is some evidence to support such differences, from laboratory experiments in learning theory principles, e.g. spontaneous recovery and reminiscence.

In a recent article (1963) Eysenck describes introverts and extraverts in more overt functional terms.

"The typical extravert is sociable, likes parties, has many friends, and needs to have people to talk to, and does not like reading or studying by himself. He craves excitement and takes chances, often sticks his neck out, acts on the spur of the moment and is generally an impulsive individual. He is fond of practical jokes, always has a ready answer; and generally likes change. He is carefree, easy going, optimistic and likes to laugh and be merry. He prefers to keep moving and doing things, tends to be aggressive and loses his temper quickly, altogether his feelings are not kept under tight control and he is not always a reliable person.

"The typical introvert is a quiet, retiring sort of person, introspective, fond of books, rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, looks before he leaps and distrusts the impulse of the moment. He does not

like excitement, takes matters of everyday life with proper seriousness, and likes a well ordered mode of life. He keeps his feelings under close control; seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic and places great value on ethical standards."

In an excellent review of literature on the question of extraversion-introversion as a dimension of personality (Patricia M. Carrigan 1960), the author refers to an earlier review by Eysenck in 1953 in which factor analytic studies of intercorrelations of personality traits were examined. At that time Eysenck argued in favor of a uni-dimensional introversion-extraversion construct, in orthogonal relations to neuroticism and psychoticism dimensions.

In the present review two general criteria are suggested as a guide line for examining research bearing on the questions of the uni-dimensionality of introversion-extraversion characteristics, and the independence of this dimension from neuroticism or some such similar adjustment dimension. These criteria as stated are:

1. If extraversion - introversion is a major and unitary dimension of personality
 - (a) it should be represented as a factor in all measures and media covering the personality domain, and
 - (b) the factors so obtained should be interrelated.
2. If extraversion - introversion and adjustment are independent dimensions

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2. If extraversion - introversion and adjustment are

independent dimensions

- (a) factors corresponding to the two dimensions should be uncorrelated, and
- (b) to the extent that some variables appear on factors of extraversion - introversion and adjustment indicators of "good" and "poor" adjustment should as frequently be associated with extraversion as with introversion.

In this review a number of studies involving diverse measures of personality traits and characteristics, such as the Guilford scales, Cattell's scales, Cattell's laboratory measures, Eysenck's experimental laboratory measures, the M.M.P.I., the Rorschach, some questionnaire data, and some behavior rating scales, were carefully examined in relation to the aforementioned criteria.

As to the unidimensionality of extraversion - introversion, the authors conclude that in most extensive questionnaire and rating studies there appear well defined E - 1 factors with some suggestions of similar factors in analysis of objective and projective tests. However there have been no empirical comparisons reported across investigations, making speculation of the similarity of factors hazardous to say the least.

Further the author comments that "virtually every analysis which has produced an extraversion like factor, has also yielded a factor identifiable with some aspect of adjustment. The adjustment factor, on the basis of one oblique factor rotation correlated - .02 with extraversion. However the author points out that most E - 1

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factors share at least a few variables with adjustment factors from the same analysis - - - - - , the shared variables tend to align with the factors in such a way that "good" adjustment is associated with extraversion and "poor" adjustment with introversion." It has been noted for example that whenever adjustment seems to split factors, "one of the factors generally bears some resemblance to "well adjusted" extraversion while another appears to reflect "maladjusted" extraversion." A similar adjustment interaction appears to occur for introversion.

The foregoing comments are suggestive of the possibility that personality types may better be explained by dimensions reflecting the interaction between adjustment and E - I, than by these dimensions themselves.

In this vein, Kassebaum, Couch and Slater, (1959) attempting to clarify the relationship between adjustment and E - I, suggested that since these were the first two orthogonal factors that emerged in the analysis, it should be possible to identify more precisely the character of "normal" and "disturbed" extraversion by rotating the axis 45 degrees. The resulting factors are called fusion factors A and B.

The following is a description of the positive and negative poles of these fusion factors A and B, accompanied by the titles suggested by the authors.

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	<u>DESCRIPTION</u>	<u>RELATED VARIABLES</u>
FACTOR (A)	1. Positive Pole	1. High loadings on
	Social withdrawal or	(a) Social introversion
	maladjusted introversion	(b) Depression
		(c) Feminine masochism
	2. Negative pole	2. High loadings on
	Social participation	(a) Social presence
	or adjusted	(b) Sociability
	extraversion	(c) Social status
FACTOR (B)	1. Positive Pole	1. High loadings on
	Impulsivity or	(a) Impulsivity
	maladjusted	(b) Hypomania
	extraversion	
	2. Negative Pole	2. High loadings on
	Intellectual control	(a) Social responsibility
	or adjusted	(b) Achievement via
	introversion	conformance

In support of these fusion factors, Couch and Keniston (1960) first successfully demonstrated a relationship between response set (tendency to agree with descriptive statements, yeasayers) and the E - 1 dimension. Sixty one paid subjects from Harvard answered 681 items from various test on a Likert type scale (1 - 7) (agreement - disagreement). Overall agreement scores were correlated with 32 M.M.P.I. scales yielding a number of significant correlations. These

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correlations suggest naysayers are more introvertive, as having intellectual interests, as being inhibited and controlled, having ego strength and showing greater tolerance. The yeasayers were more anxious, psychos-thenic and prejudiced.

A number of measures of authoritarianism were included in the study, the most central being Rokeach's authoritarianism and dogmatism scales. A factor analysis of measures of response agreement and authoritarianism was performed. The results of an orthogonal analysis split the variables nicely in accordance with these two types of measures. However, it was decided to rotate the axis 45 degrees to obtain fusion factors in the same way as the earlier work of Kassebaum et al. The fusion factors of this study could best be described as representing

- (a) desire for avoidance of stimulation, and,
- (b) control or expression of impulses.

The relationship between these dimensions and these obtained in the Kasselbaum work are obvious. Social encounter or withdrawal being analagous to the desire for avoidance of stimulation dimension, and the impulsivity - intellectual control dimension being analagous to the expression and control dimension.

Eysenck (1962) writes on the dual nature of extraversion based on a factorial study of a 70 item matrix (300 men and women). Measures of introversion - extraversion neuroticism, and lie scale items. The third emergent factor was labelled sociability vs impul-

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sivity with sociability being slightly positively related to adjustment and the impulsiveness end being slightly negatively related to adjustment.

Consideration of the relationships appearing to hold between adjustment and introversion - extraversion and in particular the possible interaction between these dimensions as suggested by the fusion factor studies, prompted the possibility of explaining personality types in terms of differing attentional preferences to stimulus areas.

Preferences for social encounter and impulsive behavior suggest a preponderance of attention directed to external stimulus sources, that is the source of stimulation occurs outside of the natural bounds of the human subject. E.g. social behavior, and natural or humanly constructed objects.

The other two preferences, social withdrawal and avoidance of stimulation, suggest a preponderance of attentional process directed inwards, that is the source of stimulation comes from within the natural bounds of the human subject via proprioceptive and interoceptive feedback, e.g. interoceptive-gut response kinds of stimulation and coded symbolic-verbally mediated kinds of stimulation.

It has long been held as descriptively meaningful to differentiate between cognitive behavior and affective behavior in psychological science. The similarity between these concepts and the internal sources of stimulation concepts, just mentioned, are quite

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apparent. Since any behavioral response is potentially a stimulus via the feedback principle, it is meaningful to speak of these sources of stimulation as mediating stimuli. Internal responses of this nature are considered as sources of stimulation by the author primarily they contribute to subsequent effective and affective behavior.

Recently Gibson (1959) in an article discussing the relation of stimulation to perception utilized the terms socially coded stimulation (stimulation resulting from attention to human interaction situations) and natural stimulation (stimulation resulting from attention to natural objects). Gibson's concepts are obviously analagous to the concepts of external sources of stimulation proposed in this paper, namely, external natural and external coded sources.

Logical analysis of these four sources of stimulation as environmental categories suggested a further possible breakdown. The description that follows represents the stimulus source areas finally chosen as the basis for obtaining a representative stimulus word list to be used in an association test. The association test was to be the measure of symbolic structure.

Refers to

- | | |
|---------------------|--|
| I. External natural | - the world of natural objects |
| II. External coded | |
| 1. Coded structures | - the results of man's purposeful rearrangements of the external natural structure |
| 2. Coded aesthetics | - the same as above with emphasis on aesthetic value |

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Refer to

I. External natural - the world of natural objects

II. External coded

1. Coded structures - the results of man's purposeful

rearrangements of the external

natural structure

2. Coded aesthetics - the same as above with emphasis

on aesthetic value

25.

3. Coded interpersonal

- human communicative gestures, expressions and symbols

4. Coded normative

- cultural values and questions of moral judgement.

III. Internal natural

1. Sensations

- emphasis on the sensuous nature of stimulation process, particularly pleasure-pain evaluations

2. Gut responses

- visceral and lower nervous system activity related to anxiety and affect.

3. Cortical disynchronization

- states of logical disorientation or to lack of conceptual organization.

IV. Internal coded

- world of symbolic structure or the coded nature of thought processes.

C. Description of the measuring instrument used to differentiate personality types.

The Myers-Briggs type indicator was chosen as a measure of the personality types, introverts - extraverts. This instrument was expressly designed to measure the Jungian typological preferences for perceptual and judgemental behaviors. There are four basic dichotomous preferences outlined in the theory: introversion -

- human communicative processes,

expressions and symbols

- external values and questions

of moral judgement.

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extraversion, sensing - intuition, thinking - feeling and judgement - perception.

For study purposes, only the introversion - extraversion scale was used. According to the authors the extravert is oriented primarily to the outer world and thus tends to focus his perception and judgement upon people and things. The introvert is oriented primarily to the inner world and thus tends to focus his perception and judgement upon concepts and ideas. (I, Myers-Griggs 1962).

The Myers-Briggs manual reports split half reliabilities, on data collected by the authors, for the introversion-extraversion scales ranging from .77 - .87 with a tendency to increase with age (high school and college samples).

The introversion and extraversion scales correlate .79 or 1.08 when corrected for attenuation ($n = 47$ college students) with the Grey-Wheelwright, a test developed completely independently of the Myers-Briggs and purporting to be a measure of the same Jungian typological dimensions. (Stricker & Ross, 1962)

The Strong Vocational Interest Blank on a sample of 727, Stanford male freshmen, was most highly positively correlated for introverts with a mathematician type of interest and for extraverts with a sales manager type of interest. (Striker & Ross, 1962)

The Vernon-Lindsey study of values test correlates positively and significantly on the theoretical and aesthetic values with introversion and on economic and political values with extraversion. (Saunders, 1957)

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The Personality Research Inventory scales, impulsiveness, talkativeness, gregariousness and attitude to work, (Striker & Ross, 1962) and the following faculty ratings, competitive, strong, active, gregarious, potential leader, carefree, pleasant, and expresses self well (Ross, 1961) all correlate in a significant positive direction with extraversion.

Generally the results of this research point to a measure of introversion which is characterized by theoretical and thinking process preferences, whereas the extraversion scale is measuring an orientation characterized by preference for interaction with people.

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of introversion which is characterized by theoretical and thinking

process preferences, whereas the extraversion scale is measuring an

orientation characterized by preference for interaction with people.

CHAPTER III

METHODOLOGY

A. General procedure.

The initial problem was to determine a sample of words representative of the chosen ecological dimensions. For these purposes a sample of approximately 35 summer school students enrolled in an introductory educational psychology course were utilized. The students were asked to give their three strongest word associations descriptive of each of the environmental categories as outlined in Chapter II. The meaning of each category was explained to the subjects in turn as they were asked to associate in each area, in order to assure a common stimulus set. Generally the most frequently occurring words in each category were chosen until a final list of 33 words was set. This set of 33 words became known as the "Word Association Test".

The total voluntary population of the senior educational psychology course, enrolled in the same summer school year, was administered both the Myers-Briggs type indicator and the Word Association Test. These tests were scored and only those protocols impossible to score because of improper attention to instructions were discarded.

On the basis of the Myers-Briggs data the 50 most extreme introverts and the 50 most extreme extraverts having usable Word Association Test protocols were selected. The appropriate procedure

CHAPTER III

MATERIALS

1. General procedure.

The initial procedure was to select a sample of 100 representative of the chosen subject population. The sample was posed a sample of approximately 20 semantic relatedness questions in an introductory educational psychology course were selected. The students were asked to give their three strongest associations descriptive of each of the environmental categories as outlined in Chapter II. The meaning of each category was explained to the subjects in turn as they were asked to associate in each case. In order to assure a common stimulus set, generally the first word of each occurring words in each category were chosen until a list of 10 words was set. This set of 10 words became known as the "word association test".

The total voluntary population of the senior educational psychology course, enrolled in the same semester, was administered both the word-association test and word-association test. These tests were administered to only those students who were to score because of interest in attention to instructions were discarded.

On the basis of the word-association data the 50 most reliable subjects and the 50 most reliable subjects were selected for the Association Test procedure and selected. The Association Test procedure

was then used to determine association matrices for these two samples. Matrix reduction and comparison followed with respect to the hypothesis previously outlined.

B. Determination of the word set for the association test.

One complete class of introductory educational psychology students was asked to cooperate with the experimenter for about one half hour. During this time a general outline of what was expected of the students presented and associational data collected. Essentially the students were asked to produce three strong associates for each of the ecological areas, focusing on objects or nouns likely to be most representative of these areas. Further, in order to restrict the range of associates somewhat, they were asked to choose nouns common to a theme centered about the university setting and way of life. It was hoped that such words would have a somewhat more representative meaning for the criterion samples used. An explanation of each ecological area was offered followed by a short opportunity for the students to ask clarifying questions.

Table I represents the associational frequencies for the five highest frequencies occurring under each of the areas. The number of choices to be made for representation of each of these areas was predetermined. Asterisks represent the words finally chosen. The final choices were usually made in an ordinal fashion with three exceptions. In the first category, external natural, grasses was eliminated, because it was considered possible to include this represent-

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TABLE I

The top five associational frequencies representative of coded areas and the choices made for the final word set

Number of word choices to be made in final draft		Ecological Areas		* Represents final choices	
I. EXTERNAL					
4	1. Natural				
	(a) Natural				
		grasses	27	*	
		trees	26	*	
		flowers	23	*	
		sky	20	*	
		people	16	*	
	2. Coded				
3	(a) Coded structures				
		buildings	30	*	
		sidewalks	27	*	
		roads	12	*	
		cars	8	*	
		parking lots	8	*	
3	(b) Coded aesthetics				
		landscape	17	*	
		paintings	15	*	
		architecture	15	*	
		murals	7	*	
		lawns	7	*	
4	(c) Coded interpersonal				
		discussions	18	*	
		sports	16	*	
		dances	16	*	
		lectures	12	*	
		friends	12	*	
3	(d) Coded normative				
		morality	21	*	
		scholarship	7	*	
		decent	6	*	
		ethical	6	*	
		courtesy	5	*	
II. INTERNAL					
	1. Natural				
4	(a) Sensations				
		passion or	34	*	
		hotness	21	*	
		coldness	11	*	
		drink	8	*	
		pain	7	*	
		food	7	*	
4	(b) Gut response				
		nausea	23	*	
		hunger	20	*	
		anxiety or	13	*	
		nervousness	17	*	
		fear	12	*	
		excitement	12	*	
3	(c) Cortical desynchronization				
		confusion	29	*	
		frustration	11	*	
		boredom	10	*	
		disgust	6	*	
		anxiety	6	*	
		fear	6	*	
4	2. Coded				
		thought	21	*	
		study	16	*	
		books	10	*	
		papers	9	*	
		discussion	7	*	

23 addition, the following information is provided for the purpose of
 use of the field and the other documents and the other documents

Number of records to be
 recorded in the field

Number of records

Number of records

Number of records

Number of records
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Number of records

Number of records

ation under the coded aesthetics, landscape concept. In the second category (coded structures) the concept cars was considered a relational middle-ground concept for roads and parking lots. Finally, in the category, sensations, the concept coldness was considered somewhat of an antonym to passion or hotness and was therefore eliminated. Ideally a set of words with equal frequency strengths would have probably yielded better discriminating power but the sampling task would have been enormous.

From the nature of the meanings of the concepts chosen in the highest frequencies by the students, it seemed that the students had understood the task.

Finally the words were randomized and a (one page) format complete with instructions was set up called the Word Association Test. A copy of this format may be found in the Appendix.

C. Determination of the introvert - extravert samples.

The population asked to participate in the final stages of the study was the entire student enrollment for the senior educational psychology course in the summer of 1964. Question booklets and answer sheets were made available as a take home exercise (to be completed in a minimum of two weeks) to all those willing to participate. Those who had completed the Myers-Briggs were given a choice of three afternoon sessions to take the Word Association Test in groups. Scorable Myers-Briggs answer sheets and completed Word Association tests were available for a total of 157 subjects.

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 George Myers-Briggs answer sheets and completed Word Association tests were available for a total of 157 subjects.

TABLE II

Frequency distribution of introverted scores and extraverted scores showing cut off points for extreme groups

SCORE	INITIAL FREQUENCY	FREQUENCY AFTER EXCLUSION OF UNACCEPTABLE ASSOCIATION DATA	TOTAL n = 164
53	1	0	
51	2	2	
49	2	1	
47	1	1	
45	1	0	
43	0	2	
41	2	2	
39	3	5	
37	5	6	
35	6	2	
33	2	2	
31	3	4	
29	4	5	
27	5	6	
25	6	1	
23	1	2	
21	2	3	
19	3	3	
17	3	1	
15	1		
15	1		
13	2		
11	6		
9	5		
7	4		
5	5		
3	3		
1	5		
1	6		
3	4		
5	2		
7	5		
9	2		
11	2		
13	1		
13	2	2	
15	8	8	
17	4	3	
19	3	2	
21	4	4	
23	2	2	
25	4	4	
27	2	1	
29	2	1	
31	5	5	
33	4	4	
35	1	1	
37	3	3	
39	1	1	
41	2	2	
43	0	0	
45	4	4	
47	1	1	
49	1	1	
51	1	1	

n = 50 - introverts

Cut off score for introverts

Mid score
n = 57 - central sample
+ 7 unacceptable
= 64 association scores

Cut off score for extraverts

n = 50 - extraverts

11-10-1964

11th

UNIT 1

5.

The standard scoring keys as provided by the publishers were used to determine introversion extraversion difference scores for each answer sheet. The difference score is obtained by subtracting a larger raw score from a lower raw score and labelling the difference in terms of the key used to obtain the larger raw score. This difference score is then transformed into a preference score via a simple $2 \times +1$ formulation. The effect is to eliminate zero scores. Table II presents the distribution of preference scores for the 157 cases scored also showing the cut off points discriminating the 50 most extreme introverts and extraverts.

Unfortunately the author does not provide overall descriptive norms for introvert and extravert scores on a sample representative of the subjects used in this study. The most comparable descriptive statistics are reported mean preference scores of 21.6 and 21.5, extraversion and introversion respectively on a sample of 2177 male liberal arts college students. Comparable means of 20.6 extraversion and 21.6 introversion were obtained for 248 female school teachers. As can easily be seen upon examining the data of Table I, scores below these means (15 and above for introverts and 13 and above for extraverts) were included in the samples meant to differentiate these two groups.

However in Table III descriptive data are presented showing the results of "t" tests which compare differences between the extreme samples and the total respective samples of each of the personality

types. The data of Table III is based on preference scores as listed in Table II.

TABLE III

"t" Tests establishing deviation of the extreme scores
from total respective introversion-extraversion scores

	N	\bar{X}	D	t (df=49)
Introverts extreme	50	31.28	> 9.58	7.26 *
Introverts total	83	21.7		
Extroverts extreme	50	28.04	> 7.14	4.61 *
Extroverts total	74	20.9		
Total sample	157	1.6-1		

* sig. $p < .05$

These statistics first of all show total sample means for introverts and extraverts very similar to the sample statistics provided by the test author. Secondly, the "t" test results support the argument that the extreme samples are different ($p < .05$) from the total samples of each of the personality types despite the fact that scores below the means were included in the differentiating extremes.

The justification for choosing 50 cases as being desirable sample sizes for the extremes was mainly in terms of inference limitations in matrix reduction with samples of less than 50, and because

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TABLE III

"t" tests establishing deviation of the extreme scores from total respective introvert-extroversion scores

Introverts		Extroverts		Total sample	
extreme	total	extreme	total		
50	83	50	74	157	
21.23	21.7	23.06	20.9	1.6-1	
D = 0.48		D = 2.11			
t (df=12) = 7.26 *		t (df=12) = 7.61 *			

* sig. $p < .05$

These statistics first of all show total sample means for introverts and extroverts very similar to the sample statistics provided by the test author. Secondly, the "t" test results support the argument that the extreme samples are different ($p < .05$) from the total samples of each of the personality types despite the fact that scores below the means were included in the differentiating extremes. The justification for choosing 50 cases as being desirable sample sizes for the extremes was mainly in terms of inference limitations in matrix reduction with samples of less than 50, and because

of the ease of determining overlap coefficients with such sample sizes.

Undoubtedly it would have been more desirable to have obtained samples of introverts and extraverts whose scores were above some specified deviation score, e.g. only scores falling two standard deviations above the mean, however, it was extremely difficult to obtain subjects on a strictly volunteer basis. Every effort was made to obtain more subjects (3 testing trials) but it seemed 157 was the maximum obtainable.

D. Determination of the word association matrices for the introvert-extravert samples.

The raw data answer sheets were obtained for the two extreme samples on the word association test. The test was administered to portions of the total group (who had completed the Myers-Briggs) in three separate sessions in a one week period. Subjects were allowed a choice of three separate times to complete their voluntary commitment in the testing program.

The test was administered according to the instructions written on the test. One minute was allowed for each association. The timing was paced by the experimenter who held an appropriate stimulus card (with the word boldly printed on it) at the front of the room for the stimulus interval. The process was repeated for a total of 33 stimuli. (33 minutes)

It should be pointed out at this point that the administration procedure in this test differs in one important respect from the

of the ease of determining overlap coefficients with small sample sizes.

Undoubtedly it would have been more desirable to have obtained

samples of introverts and extroverts whose scores were above some specified deviation score, e.g., only scores falling two standard deviations above the mean; however, it was extremely difficult to obtain subjects on a strictly volunteer basis. Every effort was made to obtain more subjects (3 testing trials) but it seemed that the maximum obtainable.

D. Determination of the word association latencies for the introvert-extrovert samples.

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It should be pointed out at this point that the administration procedure in this test differs in one important respect from the

procedures outlined by Deese. Deese's instructions do not restrict the set of responses a subject may make and as such is a strictly free association test. The instructions given in this test require the subject to restrict his or her associate to the strongest response within the set. The rationale for altering the procedure, was that it was intended to determine a matrix of inter-word association for a closed set.

The nature of the task required of the subject was made explicit before each testing session followed by a period of questions from the floor in order that misunderstandings might be clarified. The instructions appear to have been understood as only seven free association tests were discarded as being unscorable.

The raw data from the answer sheets was then tabulated for each sample to form two matrices of stimulus-response frequencies. This data in tabulated form is presented in Tables IV and V for the two samples introverts and extraverts respectively.

Then according to Deese's outlined procedures for obtaining a matrix of response overlap coefficients comparing all combinations of stimuli, the respective matrices were determined. These values appear in Tables VI and VII. The value associated with each cell in these tables may easily be obtained from Tables IV and V by summing the common responses for each stimulus item and dividing by 100 the maximum number of common response that could occur, if each stimulus elicited the other 100% of the time. The methodology for obtaining

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TABLE IV
INTROVERTS

Stimulus response association frequencies

A * STIMULUS	
RESPONSE	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
1	50 1 1 1 5 2 4
2	50 1 16 1 38 1
3	50 1 1 2 14
4	1 50 1 6 1 3 3 1 6 24 1
5	1 1 50 14 1 6 2 1 3 3 1 1 2
6	1 50 3 1 11 1 3 22 1 1
7	4 2 50 1 1 1 4 1 19 1 36 22 5 1 3
8	50 1 2 11 1 18 1 1
9	2 10 50 1 1 1 4 1 4 5 5
10	(2 1) 9 1 50 1 12 23 11
11	1 1 1 3 50 2 2 3 3 1 2 4
12	3 1 15 3 50 1 3
13	1 1 1 50 1 1 1 17
14	1 13 2 1 14 1 20 50 2 27 6 3 5 1 14 1
15	1 1 2 1 3 50 2 1 40 1 1 1
16	4 2 50 1 1 50 1 35
17	5 1 1 50 6 3 1 1
18	1 1 2 2 8 16 50 2 7
19	1 2 44 1 50 1 1
20	1 6 2 1 1 2 1 50 2 1
21	(10 41) 1 1 2 50
22	36 25 4 14 1 50 1
23	14 5 5 15 2 50 6 14 2 19
24	2 4 1 1 1 18 2 5 1 50 3 2
25	1 4 17 18 1 2 7 8 1 50
26	2 1 19 1 5 1 5 50 5
27	6 32 2 14 1 1 1 3 50 1
28	21 1 1 4 10 1 5 50
29	1 1 19 2 4 2 1 50
30	3 1 20 1 2 44 1 1 1
31	4 5 5 1 5
32	22 2 6 3 1 2
33	3 1 3 2 4 3 2 1

$n_1 + n_2 = N(\text{number of common responses for stimulus pair } 1 + 2) = \text{overlap coefficient}$
 $10 + 1 = \frac{11}{100}$
 = .11

NOTE: Circles in columns 1 and 2 represent instances of common responses for a given stimulus pair.
 $n_1 - nk$ is the number of common responses for each circle indicating where common

A* - Word Number on Association Test

TABLE V
EXTRAVERTS
Stimulus response association frequencies

A * STIMULUS																												
RESPONSE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
1	50	2	1						1									4	2								5	
2		50												1		18			42									
3			50	1	2													4										
4				50					10			1						4										
5	1			50					9				8	1			1	2		2	1	1	6	1				
6					2	50	2	2		8			1		1					16								
7	1	6		4	50	5							6	1	4					20	1	31	16	1				
8						3	50			1	21									20	1							
9	1	1		10	1	1	50						2	1			1	1		6	3	3	4	1				
10	2			13					50			2			1		1	12		1	19						7	
11		2					1			50		1	3				1	3		1	1							
12					4	12					1	50					3											
13	1			1							3	50																
14	1			1	12	1	3		3	1	14	24	50	2	1	2	24	2	1				2	1	1			
15					2			2					2	50	1	41	1						1				1	
16						2	2	1			3				50					6								
17		7					1									50	7						1	1			1	
18				1							2		13	1	13	50												
19			1											3	38	2	1	50						1	1		1	
20	3					1			1	5			1	3		3	1	1	50				1	2	2		2	
21		4	42																50								1	
22					35			22		1	16									50								
23				14	1	3		12		16	2						3						50	2	19		2	
24			4		6	2				2	15			3		1	2	2	2				50			4		
25				6		8		17		3						1			7				1	50	2			
26				1		1		13		1													7	2	50	3		
27		10								15			1				1	2					9			50		
28				20		1	1		3						1					1			10	3		5		
29												1	21	5			6	1	1							2		
30								1	3		21		1	1	43													
31						3		8	2		2	1																
32		20																										
33																												

$n_1 + n_2$ = N(number of common responses for stimulus pair 1 + 2) = overlap coeff
 $1 + 4 = \frac{5}{100}$
 = .05
 NOTE: Circles in columns 1 and 2 represent instances of common responses for a gi
 n_1 - nk is the number of common responses for each circle indicating where

[illegible]

COLLECTED

TABLE VI
Introverts - Overlap Coefficients

A*	B*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33																																																																																																																																																																																																																																												
1	pain	1.00	.11	.02	.13	.01	.02	.01	.02	.05	.13	.02	.02	.04	.07	.03	.00	.08	.04	.01	.11	.18	.02	.02	.02	.09	.01	.00	.16	.00	.03	.01	.01	.48	.15																																																																																																																																																																																																																																											
2	food		1.00	.00	.02	.03	.00	.01	.01	.04	.01	.01	.02	.02	.02	.01	.00	.24	.06	.02	.07	.79	.00	.02	.04	.02	.02	.01	.05	.02	.02	.03	.11	.04																																																																																																																																																																																																																																												
3	papers			1.00	.03	.15	.03	.18	.03	.24	.04	.03	.02	.05	.11	.01	.02	.01	.01	.00	.11	.00	.02	.37	.06	.16	.28	.05	.04	.05	.03	.01	.02																																																																																																																																																																																																																																													
4	nervousness				1.00	.02	.00	.01	.00	.06	.36	.02	.02	.06	.12	.02	.00	.06	.06	.01	.19	.02	.01	.02	.26	.01	.01	.74	.01	.07	.01	.02	.16	.09																																																																																																																																																																																																																																												
5	discussions					1.00	.00	.29	.01	.36	.03	.14	.01	.15	.25	.03	.01	.04	.14	.08	.16	.00	.00	.22	.12	.32	.15	.04	.16	.15	.04	.04	.00	.12	.00																																																																																																																																																																																																																																											
6	paintings						1.00	.04	.36	.00	.10	.11	.30	.01	.02	.01	.06	.00	.02	.00	.04	.01	.67	.01	.01	.00	.01	.01	.01	.00	.07	.39	.01	.02	.04																																																																																																																																																																																																																																											
7	university							1.00	.02	.15	.02	.09	.04	.04	.11	.00	.06	.03	.04	.02	.12	.00	.02	.39	.05	.60	.48	.03	.17	.04	.09	.02	.00	.00	.04																																																																																																																																																																																																																																											
8	trees								1.00	.01	.00	.12	.46	.03	.03	.00	.02	.01	.01	.00	.07	.01	.55	.01	.02	.00	.01	.00	.01	.00	.06	.39	.02	.03	.03																																																																																																																																																																																																																																											
9	thought									1.00	.07	.03	.02	.06	.14	.04	.01	.04	.03	.05	.11	.00	.01	.32	.12	.16	.30	.08	.32	.05	.04	.05	.03	.09	.09																																																																																																																																																																																																																																											
10	frustration										1.00	.03	.02	.05	.16	.05	.01	.04	.10	.02	.24	.03	.01	.02	.53	.01	.02	.37	.01	.06	.02	.02	.15	.13	.11																																																																																																																																																																																																																																											
11	sidewalks											1.00	.16	.19	.22	.00	.25	.04	.17	.06	.10	.00	.12	.01	.11	.01	.01	.00	.01	.17	.30	.11	.04	.11																																																																																																																																																																																																																																												
12	flowers												1.00	.06	.08	.01	.04	.06	.06	.02	.09	.01	.41	.00	.04	.00	.00	.00	.00	.04	.07	.38	.03	.07	.03																																																																																																																																																																																																																																											
13	cars													1.00	.31	.00	.01	.05	.42	.06	.12	.00	.02	.01	.13	.01	.03	.04	.01	.56	.05	.03	.05	.16	.03																																																																																																																																																																																																																																											
14	people															1.00	.03	.16	.45	.12	.19	.03	.01	.08	.23	.09	.06	.09	.06	.32	.10	.04	.08	.23	.03																																																																																																																																																																																																																																											
15	morality																1.00	.04	.05	.84	.03	.02	.00	.01	.03	.02	.01	.02	.01	.02	.01	.02	.01	.17	.03																																																																																																																																																																																																																																											
16	architecture																	1.00	.01	.00	.01	.00	.03	.01	.01	.01	.01	.00	.01	.01	.81	.03	.00	.00	.00																																																																																																																																																																																																																																											
17	drinks																		.26	.05	.14	.19	.00	.00	.06	.00	.00	.03	.00	.13	.03	.03	.16	.10	.03																																																																																																																																																																																																																																											
18	dances																	1.00	.07	.13	.02	.01	.00	.02	.10	.00	.01	.03	.00	.27	.04	.04	.09	.22	.02																																																																																																																																																																																																																																											
19	decency																			1.00	.06	.00	.00	.00	.07	.01	.01	.01	.01	.08	.02	.02	.01	.20	.01																																																																																																																																																																																																																																											
20	boredom																				1.00	.03	.05	.13	.26	.11	.06	.19	.05	.12	.07	.08	.19	.13	.03																																																																																																																																																																																																																																											
21	hunger																					1.00	.01	.00	.00	.00	.00	.06	.00	.01	.00	.01	.00	.11	.08	.03																																																																																																																																																																																																																																										
22	landscape																						1.00	.00	.01	.00	.00	.03	.01	.00	.00	.05	.50	.02	.03	.03																																																																																																																																																																																																																																										
23	studies																							1.00	.05	.39	.49	.04	.46	.02	.03	.03	.03	.01	.03	.01	.03																																																																																																																																																																																																																																									
24	confusion																								1.00	.06	.03	.24	.04	.12	.05	.05	.05	.13	.11	.03	.11																																																																																																																																																																																																																																									
25	lectures																									1.00	.34	.03	.18	.01	.03	.03	.03	.00	.02	.02	.02																																																																																																																																																																																																																																									
26	scholarship																										1.00	.03	.36	.01	.03	.03	.03	.00	.03	.03	.03																																																																																																																																																																																																																																									
27	anxiety																											1.00	.03	.04	.00	.00	.00	.00	.16	.11	.03																																																																																																																																																																																																																																									
28	books																												1.00	.01	.03	.03	.03	.00	.02	.02	.02	.02																																																																																																																																																																																																																																								
29	sports																													1.00	.01	.03	.03	.00	.02	.06	.18																																																																																																																																																																																																																																									
30	buildings																														1.00	.02	.02	.02	.06	.18	.03																																																																																																																																																																																																																																									
31	sky																															1.00	.07	.02	.04	.04	.04	.04																																																																																																																																																																																																																																								
32	nausea																																1.00	.03	.05	.05	.05	.05	.05																																																																																																																																																																																																																																							
33	passion																																	1.00	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09</

Mean overlap coefficient = .081

A * - Word number on association test B * - Actual word on association test

TABLE VII
Extraversts - Overlap Coefficients

A*	B*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		
1	pain	1.00	.05	.01	.22	.08	.02	.03	.00	.07	.21	.02	.00	.05	.08	.07	.02	.09	.04	.07	.14	.11	.01	.05	.21	.06	.04	.26	.03	.06	.03	.01	.52	.14		
2	food		1.00	.00	.01	.02	.01	.01	.00	.01	.00	.01	.00	.00	.02	.01	.00	.25	.07	.01	.00	.85	.00	.01	.02	.02	.01	.03	.01	.00	.00	.01	.12	.06		
3	papers			1.00	.01	.16	.01	.27	.01	.26	.02	.03	.00	.02	.10	.03	.05	.01	.03	.02	.16	.01	.01	.37	.02	.18	.28	.03	.48	.03	.03	.00	.03	.02		
4	nervousness				1.00	.05	.01	.02	.00	.04	.46	.02	.01	.06	.05	.03	.01	.06	.04	.04	.23	.06	.00	.02	.35	.02	.02	.59	.01	.08	.02	.00	.18	.10		
5	discussions					1.00	.05	.21	.02	.41	.07	.13	.02	.12	.28	.09	.07	.06	.16	.09	.19	.03	.04	.18	.14	.28	.18	.09	.16	.15	.03	.07	.04	.13		
6	paintings						1.00	.04	.33	.07	.01	.08	.32	.01	.03	.03	.03	.01	.04	.02	.01	.02	.61	.03	.03	.02	.03	.01	.02	.01	.06	.38	.01	.06		
7	universities							1.00	.02	.25	.03	.06	.00	.04	.11	.04	.09	.02	.03	.03	.13	.01	.03	.42	.05	.56	.46	.05	.24	.05	.02	.02	.02	.03		
8	trees								1.00	.04	.00	.09	.52	.02	.03	.00	.06	.00	.04	.00	.01	.00	.54	.02	.01	.00	.00	.00	.00	.00	.08	.40	.00	.05		
9	thought									1.00	.07	.05	.03	.03	.25	.10	.07	.06	.07	.09	.13	.02	.06	.33	.15	.22	.33	.08	.31	.06	.03	.09	.02	.07		
10	frustration										1.00	.01	.00	.05	.06	.06	.01	.08	.05	.28	.04	.00	.06	.04	.52	.05	.03	.39	.03	.06	.02	.00	.14	.08		
11	sidewalks											1.00	.04	.20	.19	.02	.26	.03	.18	.03	.02	.00	.10	.02	.04	.02	.02	.01	.00	.18	.30	.06	.03	.12		
12	flowers												1.00	.00	.03	.01	.02	.02	.05	.00	.00	.00	.47	.01	.01	.00	.00	.00	.00	.02	.03	.39	.00	.07		
13	cars													1.00	.31	.03	.02	.04	.31	.04	.07	.01	.02	.02	.07	.01	.03	.04	.00	.56	.03	.01	.06	.10		
14	people														1.00	.13	.07	.24	.50	.13	.11	.02	.05	.11	.13	.17	.12	.10	.06	.30	.07	.05	.04	.18		
15	morality															1.00	.02	.10	.06	.84	.07	.02	.01	.05	.10	.07	.05	.08	.05	.05	.02	.02	.03	.19		
16	architecture																1.00	.01	.01	.01	.02	.00	.09	.04	.03	.06	.06	.01	.02	.02	.84	.03	.02	.01		
17	drinks																	1.00	.27	.08	.08	.21	.00	.02	.10	.05	.01	.10	.01	.11	.02	.01	.16	.17		
18	dances																		1.00	.07	.06	.00	.03	.02	.07	.04	.03	.07	.01	.30	.03	.02	.09	.22		
19	decency																			1.00	.08	.01	.01	.04	.09	.04	.04	.07	.02	.04	.02	.02	.03	.19		
20	boredom																				1.00	.03	.03	.11	.25	.16	.07	.21	.11	.06	.05	.01	.14	.09		
21	hunger																					1.00	.00	.02	.03	.01	.02	.06	.02	.02	.00	.01	.11	.05		
22	landscape																						1.00	.03	.02	.02	.01	.00	.02	.00	.11	.50	.00	.03		
23	studies																							1.00	.07	.31	.51	.07	.50	.02	.02	.05	.02	.01		
24	confusion																								1.00	.10	.07	.32	.07	.09	.03	.05	.16	.10		
25	lectures																									1.00	.28	.08	.14	.03	.02	.03	.03	.03		
26	scholarship																										1.00	.05	.37	.03	.02	.04	.03	.02	.02	
27	anxiety																											1.00	.06	.07	.02	.02	.02	.21	.16	
28	books																												1.00	.06	.07	.02	.01	.01	.01	
29	sports																													1.00	.02	.01	.04	.01	.01	
30	buildings																														1.00	.03	.00	.07	.14	
31	sky																															1.00	.04	.02	.02	
32	nausea																																1.00	.00	.04	
33	passion																																	1.00	.19	1.00

Mean overlap coefficient = .087

A* - Word number on association test B* - Actual word on association test

Mean overlap coefficient = .007

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 pain	1.00														
2 food	.04	1.00													
3 books	.01	.00	1.00												
4 nervousness	.01	.01	.01	1.00											
5 examinations	.01	.01	.01	.01	1.00										
6 paintings	.01	.01	.01	.01	.01	1.00									
7 university	.01	.01	.01	.01	.01	.01	1.00								
8 trees	.01	.01	.01	.01	.01	.01	.01	1.00							
9 thought	.01	.01	.01	.01	.01	.01	.01	.01	1.00						
10 frustration	.01	.01	.01	.01	.01	.01	.01	.01	.01	1.00					
11 idealistic	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	1.00				
12 flowers	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	1.00			
13 cars	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	1.00		
14 people	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	1.00	
15 normality	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	1.00
16 architecture	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
17 drinks	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
18 glasses	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
19 glasses	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
20 glasses	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
21 hunger	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
22 landscape	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
23 studies	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
24 construction	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
25 lectures	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
26 scholarship	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
27 anxiety	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
28 books	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
29 sports	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
30 buildings	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
31 city	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
32 houses	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
33 position	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01

the overlap coefficient value for cells 1 x 2 in each sample is demonstrated in Tables IV and V in the lower left hand corner. All other values were obtained in a similar manner, e.g.

Column 1 x 2 1 x 33

Column 2 x 3 2 x 33 etc

E. Methodology of data analysis.

The first comparisons between matrices were quite simple. For the overlap coefficient scores it was possible to obtain a matrix of differences by simply subtracting data from comparable cells. Differences favoring introverts were given a positive score and those favoring extraverts a negative score. The mean and standard deviation were calculated and scores falling at the extremes of the distribution were scrutinized in relation to some of the hypothesized differences.

Second, a Pearson product moment r was calculated to determine the extent of relationship between matrices. The appropriate significance level was reported.

The sample matrices were reduced in rank utilizing a principal components type of factoring model, as outlined in Chapter 9 of Harmon (1960). The operations were performed using an IBM 7090 fortran routine (G2, BC, FA80 written by Alan B. Wilson at the Survey Research Center at the University of California, Berkeley.) The reduced rank was specified to be equal to the number of eigen values which are equal to or greater than 1.0. The convergence error

the overlap coefficient value for cells 1 x 2 in each sample is demonstrated in Tables IV and V in the lower left hand corner. All other

values were obtained in a similar manner, e.g.

Column 1 x 2 1 x 33

Column 2 x 3 2 x 33

B. Methodology of data analysis.

The first comparisons between matrices were quite simple.

For the overlap coefficient scores it was possible to obtain a matrix of differences by simply subtracting data from comparable cells.

Differences favoring introverts were given a positive score and those favoring extraverts a negative score. The mean and standard deviation were calculated and scores falling at the extremes of the distribution were scrutinized in relation to some of the hypothesis-
ed differences.

Second, a Pearson product moment r was calculated to deter-

mine the extent of relationship between matrices. The appropriate significance level was reported.

The sample matrices were reduced in rank utilizing a principal components type of factoring model, as outlined in Chapter 2 of Vernon (1960). The operations were performed using an IBM 7090 Fortran routine (01, 90, 7480 written by Alan S. Wilson at the Survey Research Center at the University of California, Berkeley). The reduced rank was specified to be equal to the number of eigen values which are equal to or greater than 1.0. The convergence error

for iterative subroutines involved in the solution of eigen values was set at $+ 0.1E-04$ as suggested in the program.

The factor matrix was then rotated according to the varimax criterion as a part of the same fortran routine.

Preliminary comparisons were then made on rotated factor matrices by looking at the top five loadings on each factor. Factors across matrices showing the greatest similarity were related utilizing the procedures suggested by Tucker (1951) and Wrigley and Neuhaus (1955) to obtain a coefficient of congruence.

Essentially this procedure is based on an unadjusted correlation formula initially proposed by Burt. It certainly is not a correlation, however, in that the "a"'s (factor loadings for respective samples) are not deviates from their respective means and the summations are over the n variables instead of the number of individuals (Harmon 1960).

There is an example in Osgood et al (1957 pp 42-46), "The Measurement of Meaning", which utilizes this same procedure for comparing semantic differential types of items across samples for similar variables. This presentation served a model for making similar comparisons in this study.

for iterative subroutines involved in the solution of eigen values

was set at $\pm 0.12-0.14$ as suggested in the program.

The factor matrix was then rotated according to the varimax

criterion as a part of the same rotation routine.

Preliminary comparisons were made on rotated factor

matrices by looking at the top five loadings on each factor. Factors

across matrices showing the greatest similarity were retained until

using the procedures suggested by Tucker (1952) and Nunnally and Nunnally

(1952) to obtain a coefficient of congruence.

Essentially this procedure is based on an unadjusted corre-

lation formula initially proposed by Hotelling. It certainly is not a

correlation, however, in that the "a's" (factor loadings for respec-

tive samples) are not deviates from their respective means and the

summations are over the n variables instead of the number of individuals

(Hanson 1960).

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"Measurement of Meaning", which utilized this same procedure for com-

paring semantic differential types of items across samples for

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CHAPTER IV

PRESENTATION OF THE DATA

The data is presented more in terms of the logical order of the analysis than in terms the hypothesis sequence outlined in Chapter I.

A. Comparisons of the initial overlap coefficient matrices.

The first comparison was made by calculating the Pearson product moment correlation, between matrices, on the overlap coefficients. The resulting r was .85. This statistic is well above the critical value ($p < .05$) for an n of 50 in testing the difference from zero or no correlation. This high initial correlation between matrices suggests that matrix reduction should be fairly comparable across samples. The aim of setting the stimulus words such that the majority of the variance would be common appears to have been met on this initial criterion.

A preliminary comparison of the matrices aimed at pointing to some of the sample differences was possible simply by subtracting one matrix from the other. Table VIII represents these differences, + scores referring to differences favoring the introvert sample and - scores referring to differences favoring extravert scores. As is readily observable, the differences are generally very small, 81/528 or 15.3% of these differences being zero. The range is .27 and the mean -1.3. The mean suggests that the word list was slightly biased }

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TABLE VIII
Overlap Coefficient Differences Between Samples

A*	B*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
1	pain	+0.00	+0.06	+0.01	-0.02	-0.07	+0.00	-0.02	+0.02	-0.02	-0.08	+0.00	+0.02	-0.01	-0.01	-0.04	-0.02	-0.02	+0.00	-0.06	-0.03	+0.07	+0.01	-0.03	-0.12	-0.05	-0.04	-0.10	-0.03	-0.03	-0.02	+0.00	-0.04	+0.01	
2	food	+0.00	+0.00	+0.01	+0.01	-0.01	-0.01	+0.01	+0.01	+0.03	+0.01	+0.00	+0.02	+0.02	+0.00	+0.00	+0.00	-0.01	-0.01	+0.01	+0.07	-0.06	+0.00	+0.01	+0.02	+0.00	+0.01	-0.02	+0.01	+0.02	+0.02	+0.02	-0.01	-0.02	
3	papers			+0.00	+0.02	-0.01	+0.02	-0.02	+0.02	-0.02	+0.02	+0.00	+0.02	+0.03	+0.01	-0.02	-0.03	+0.01	-0.02	-0.02	-0.05	-0.01	+0.01	+0.00	+0.04	-0.02	+0.00	+0.02	+0.08	+0.01	+0.02	+0.03	-0.02	-0.01	
4	nervousness				+0.00	-0.03	-0.01	+0.00	+0.02	+0.02	-0.10	+0.00	+0.01	+0.00	+0.07	-0.01	-0.06	-0.03	+0.00	-0.03	-0.04	-0.04	+0.01	+0.00	-0.02	-0.01	-0.01	+0.15	+0.00	-0.01	-0.01	+0.02	-0.02	-0.01	
5	discussions					+0.00	-0.05	-0.01	-0.05	-0.07	-0.04	+0.01	-0.01	+0.03	-0.03	-0.06	-0.06	-0.02	-0.02	-0.01	-0.03	-0.03	-0.04	-0.04	-0.02	+0.04	-0.03	-0.05	+0.00	+0.00	+0.01	-0.03	-0.04	-0.01	
6	paintings						+0.00	+0.03	-0.03	-0.07	+0.00	+0.03	-0.02	+0.00	-0.01	-0.02	-0.03	-0.01	-0.02	-0.02	-0.03	-0.01	+0.06	-0.02	-0.02	-0.02	-0.03	-0.05	+0.00	+0.00	+0.01	-0.01	+0.01	-0.01	
7	universality							+0.00	+0.00	-0.10	-0.01	+0.03	+0.04	+0.00	+0.00	-0.04	-0.03	+0.01	+0.01	-0.01	-0.01	-0.01	-0.01	-0.03	+0.00	+0.04	+0.02	-0.02	-0.01	-0.01	+0.01	+0.01	+0.00	-0.04	
8	trees								+0.00	-0.03	+0.00	+0.03	-0.06	+0.01	+0.00	-0.04	-0.04	+0.01	-0.03	+0.00	+0.06	+0.01	-0.01	-0.01	+0.01	+0.00	+0.01	+0.00	+0.01	-0.01	+0.04	+0.00	-0.02	+0.01	
9	thought									+0.00	+0.00	-0.02	-0.01	+0.03	-0.11	-0.06	-0.06	-0.02	-0.04	-0.04	-0.02	-0.02	-0.05	-0.01	-0.01	-0.03	-0.06	-0.03	+0.00	+0.01	-0.01	+0.00	-0.02	-0.02	
10	frustration										+0.00	+0.02	+0.02	+0.00	+0.10	-0.01	+0.00	-0.04	+0.05	-0.03	-0.04	-0.02	-0.05	-0.01	-0.03	-0.06	-0.03	+0.00	+0.01	-0.01	+0.01	-0.01	+0.01	+0.02	
11	sidewalks											+0.00	+0.12	-0.01	+0.03	-0.02	-0.01	+0.01	-0.01	+0.03	+0.08	+0.00	+0.02	-0.01	-0.01	-0.07	-0.01	-0.02	-0.02	+0.00	+0.00	+0.02	+0.05	-0.01	
12	flowers												+0.00	+0.06	+0.05	+0.00	+0.02	+0.04	+0.01	+0.02	+0.09	+0.01	-0.06	-0.01	+0.03	+0.00	-0.01	+0.00	+0.01	+0.00	+0.02	-0.02	-0.01	+0.03	
13	cars													+0.00	+0.00	-0.03	-0.01	+0.01	+0.11	+0.02	+0.05	-0.01	+0.00	-0.01	-0.03	+0.00	-0.06	-0.01	+0.00	+0.02	+0.03	-0.01	+0.04	+0.05	
14	people														+0.00	-0.04	-0.04	-0.08	-0.05	-0.01	+0.08	+0.01	-0.04	-0.03	+0.10	-0.08	-0.06	-0.01	+0.00	+0.02	+0.00	+0.00	-0.02	-0.02	
15	morality															+0.00	-0.02	-0.06	-0.01	+0.00	-0.04	+0.00	-0.01	-0.04	-0.07	-0.05	-0.04	-0.06	-0.03	-0.04	+0.00	+0.00	-0.02	-0.01	
16	architecture																+0.00	-0.02	-0.01	-0.01	-0.01	+0.00	-0.06	-0.03	-0.02	-0.05	-0.05	-0.01	-0.01	-0.01	-0.03	+0.00	-0.02	-0.01	
17	drinks																	+0.00	-0.01	-0.01	-0.03	-0.02	+0.00	-0.02	-0.04	-0.05	-0.01	-0.07	-0.01	+0.02	+0.01	+0.02	+0.04	-0.07	
18	dances																		+0.00	+0.00	+0.06	+0.02	+0.00	-0.02	-0.03	-0.04	-0.02	-0.04	-0.01	-0.03	+0.01	+0.02	+0.00	+0.00	
19	decency																			+0.00	+0.07	+0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.06	-0.01	+0.04	+0.00	+0.00	-0.02	+0.01	
20	boredom																				-0.02	-0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.06	-0.01	+0.06	+0.02	+0.07	+0.05	+0.04	
21	hunger																				+0.00	+0.00	+0.02	+0.02	+0.01	-0.05	-0.01	-0.02	-0.06	+0.06	+0.02	+0.01	+0.00	+0.03	
22	landscape																					+0.00	+0.01	-0.02	-0.03	-0.01	-0.02	+0.00	-0.02	-0.01	+0.00	+0.02	+0.00	+0.00	
23	studies																							+0.00	-0.02	+0.08	-0.02	-0.03	-0.04	+0.00	+0.01	-0.02	-0.01	+0.02	
24	confusion																								+0.00	-0.04	-0.08	-0.03	-0.03	+0.03	-0.02	+0.00	-0.02	+0.01	+0.01
25	lectures																									-0.04	-0.04	-0.08	-0.05	+0.04	-0.02	+0.01	+0.00	-0.03	-0.01
26	scholarship																									+0.00	+0.06	-0.05	+0.01	-0.02	+0.01	+0.00	+0.00	-0.03	-0.01
27	anxiety																																		+0.01
28	books																																		-0.04
29	sports																																		-0.01
30	buildings																																		-0.01
31	sky																																		-0.01
32	nausea																																		-0.01
33	passion																																		-0.01

+ Scores refer to differences favoring introverts

- Scores refer to differences favoring extraverts

+ Scores refer to differences favoring introverts
- Scores refer to differences favoring extraverts

A* - Word number on association test B* - Actual word on association test

TABLE

Word Association Test

Word	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
passion	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
nausea	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
sky	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
buildings	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
sports	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
books	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
anxiety	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
scholarship	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
lectures	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
contrast	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
studies	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
landscape	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
hunger	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
border	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
decency	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
dances	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
drinks	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
architecture	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
morality	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
people	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
cars	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
flowers	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
sidewalks	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
frustration	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
thought	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
trees	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
university	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
paintings	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
discussions	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
seriousness	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
papers	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
food	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
pain	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	

+ Scores refer to differences favoring the word in the list
- Scores refer to differences favoring the word in the list

Word number on association test - *

TABLE IX

Rank order of greatest differences favoring introverts and extraverts for stimulus X stimulus comparisons

INTROVERTS			EXTRAVERTS		
Word Relations	Size of Difference	Clusters	Word Relations	Size of Difference	Clusters
1 nervousness - anxiety	.15		1 pain - confusion	.12	
2 sidewalks - flowers	.12		2 thought - people	.11	
3 cars - dances	.11		3 university - thought	.10	
4 frustration - people	.10		4 nervousness - frustration	.10	
5 people - confusion	.10		5 pain - anxiety	.10	
6 flowers - boredom	.09		6 nausea - passion	.10	
7 discussions - university	.08		7 pain - nervousness	.09	
8 people - boredom	.08		8 nervousness - confusion	.09	
9 studies - lectures	.08		9 papers - university	.09	
10 sidewalks - boredom	.08		10 pain - frustration	.08	
11 papers - books	.08		11 confusion - anxiety	.08	
			12 people - drinks	.08	
			13 people - lectures	.08	

NOTE: The relation of the prominent clusters is shown by the adjoining lines, the dashed lines indicating more peripheral relationships.

TABLE IV

Rank order of average difference between the observed and expected frequencies for the various combinations

Observed frequencies		Expected frequencies	
Rank order of difference	Observed frequencies	Rank order of difference	Expected frequencies
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
48	48	48	48
49	49	49	49
50	50	50	50
51	51	51	51
52	52	52	52
53	53	53	53
54	54	54	54
55	55	55	55
56	56	56	56
57	57	57	57
58	58	58	58
59	59	59	59
60	60	60	60
61	61	61	61
62	62	62	62
63	63	63	63
64	64	64	64
65	65	65	65
66	66	66	66
67	67	67	67
68	68	68	68
69	69	69	69
70	70	70	70
71	71	71	71
72	72	72	72
73	73	73	73
74	74	74	74
75	75	75	75
76	76	76	76
77	77	77	77
78	78	78	78
79	79	79	79
80	80	80	80
81	81	81	81
82	82	82	82
83	83	83	83
84	84	84	84
85	85	85	85
86	86	86	86
87	87	87	87
88	88	88	88
89	89	89	89
90	90	90	90
91	91	91	91
92	92	92	92
93	93	93	93
94	94	94	94
95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100

in terms of extraverted responses or associations. There was more opportunity for the extraverts to spread out their responses and thus have higher frequencies of common responses for stimulus x stimulus comparisons. There were 273 differences favoring extraverts as opposed to 174 favoring introverts. However, because an equal number of responses were made by both samples there was a resultant tendency for the extravert scores to be more closely constructed about the mean and a smaller range whereas the opposite was true for the introvert scores.

An attempt was made to select the extreme difference scores in the distribution of Table VIII. The underlined scores in Table VIII represent the extreme difference scores favoring introverts and extraverts, 11/174 or 6.32% and 13/273 or 4.76% of the total number of sample differences, respectively.

Table IX presents the descending rank order differences favoring introverts and extraverts as extracted from Table I.

Here the first interesting comparisons emerge. A rational analysis of the stimulus x stimulus relations suggested groupings as indicated in Table II.

Three major groups emerge for introverts and two for the extraverts. The introverted pattern appears to fit fairly well with the typical introvert concept. The cars - dances relation is only comparison that is somewhat difficult to explain. For the extravert sample, however, it is somewhat surprising that the clusters

in terms of extraver- sive responses or associations. There was more opportunity for the extraverts to spread out their responses and thus have higher frequencies of common responses for stimuli x stimulus comparisons. There were 273 differences favoring extraverts as opposed to 174 favoring introverts. However, because an equal number of responses were made by both samples there was a resultant tendency for the extravert scores to be more closely connected about the mean and a smaller range whereas the opposite was true for the introvert scores.

An attempt was made to select the extreme difference scores in the distribution of Table VIII. The underlined scores in Table VIII represent the extreme difference scores favoring introverts and extraverts, 11/17 or 6.3% and 12/13 or 4.6% of the total number of sample differences, respectively.

Table IX presents the descending rank order differences favoring introverts and extraverts as extracted from Table I. Here the first interesting comparisons emerge. A rational analysis of the stimulus x stimulus relations suggested groupings as indicated in Table II.

Three major groups emerge for introverts and two for the extraverts. The introverted pattern appears to fit fairly well with the typical introvert concept. The case - dance relation is only comparison that is somewhat difficult to explain. For the extravert sample, however, it is somewhat surprising that the clusters

take the form they do. This sample of extraverts as defined by the Myers-Briggs personality inventory appear to be much more internally oriented, in both a cortical desynchronization and gut response sort of way, than would have been predicted on the basis of ecological dimension attention theory, although Jungian theory is able to account for this finding.

In making some cross comparisons it is interesting to note that introverts more highly relate people with cortical types of disinterest or frustration and tend to relate boredom to people in the same way as boredom is related to external objects, flowers and sidewalks. On the other hand disorganization and gut responses tend to be highly interrelated for extraverts and at the same time held separate from people. Generally extraverts are more concerned with disorganization and gut responses.

Comparing the study and learning type concepts or clusters II x II there appears to be more people relatedness for the extraverts while the introverts appear more concerned with study and learning per se. The external environment including people objects seems to be generally boring for the introvert.

There are certain obvious limitations to these initial comparisons in that only the differences are compared. Later comparisons in which differences are related to similarities may be more meaningful in that some of the highest differences may in turn be differentially related to common clusters of high associative overlap.

The data of this section may be taken as partially confirming some of the predictions of hypothesis III, the observed differences being somewhat in line with introvert-extravert theory.

B. Matrix reduction and comparisons of common factors.

Tables X and XI present the initial principle components solutions for the sample matrices in question. In both cases ten factors emerge with a criterion of stopping all factoring for eigenvalues equal to or less than 1.0. The total proportion of communality accounted for is $\frac{20.84}{33.00}$ or 63.2% for the introvert sample and $\frac{20.73}{33.00}$ or 62.8% for the extravert sample. As can be observed from the p values (uniqueness) for the individual variables in some cases very little of the total variance is being accounted for in terms of unique factor loadings.

Tables XII and XIII present the varimax rotation solutions for the same factors. Considerable improvement is made in both cases in terms of the varimax criterion of evenly distributing the proportion of variance to be accounted for by each factor, as well as generally improving simple structure.

On the basis of some initial observations of factor loadings above .30 for each factor on each sample, it was apparent which factors would likely be highly related. Comparisons were made on such factors across samples by means of the coefficient of overlap. Table XIV presents this data.

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TABLE X
Factor Analysis - Introverts

Eigenvalues										
3.826	2.867	2.715	2.131	1.920	1.867	1.773	1.303	1.250	1.195	
Proportion of Total Communality Accounted for by Factor										
0.116	0.087	0.082	0.065	0.058	0.057	0.054	0.039	0.038	0.036	
Principal Components										
1	2	3	4	5	6	7	8	9	10	
1	0.227	0.139	-0.241	0.255	0.203	0.073	0.070	0.056	0.550	-0.452
2	0.158	0.094	-0.159	0.152	0.799	0.185	0.042	0.041	-0.362	-0.039
3	0.398	-0.360	0.211	0.082	0.001	-0.007	-0.009	0.519	0.058	0.125
4	0.336	0.144	-0.385	0.451	-0.334	0.033	0.096	0.024	-0.237	-0.090
5	0.465	-0.230	0.054	-0.175	-0.004	-0.052	-0.110	-0.185	-0.080	-0.040
6	0.202	0.472	0.508	0.135	-0.006	-0.086	-0.012	0.005	-0.030	-0.053
7	0.459	-0.408	0.259	-0.005	0.032	0.050	-0.005	-0.519	-0.015	-0.146
8	0.214	0.480	0.495	0.129	0.012	-0.105	-0.051	0.008	-0.004	-0.002
9	0.436	-0.301	0.105	0.041	0.009	-0.062	0.004	0.233	-0.006	-0.033
10	0.366	0.144	-0.366	0.342	-0.290	0.012	0.086	-0.025	-0.137	0.106
11	0.316	0.233	0.078	-0.331	-0.093	0.286	0.056	-0.017	-0.027	-0.064
12	0.247	0.464	0.401	0.056	0.014	-0.078	-0.055	-0.017	0.006	0.039
13	0.371	0.158	-0.212	-0.450	-0.067	-0.013	-0.389	0.130	-0.092	-0.213
14	0.517	0.116	-0.211	-0.344	-0.059	-0.040	-0.188	0.016	-0.069	0.028
15	0.160	0.051	-0.123	-0.266	0.100	-0.572	0.669	0.805	-0.812	-0.806
16	0.142	0.108	0.138	-0.282	-0.137	0.695	0.480	0.029	0.000	-0.001
17	0.289	0.161	-0.238	-0.012	0.370	0.064	-0.076	-0.138	0.247	0.599
18	0.380	0.194	-0.251	-0.402	0.040	-0.030	-0.301	0.016	0.016	0.058
19	0.199	0.068	-0.135	-0.329	0.092	-0.571	0.627	-0.009	-0.022	-0.006
20	0.478	0.116	-0.199	0.117	0.042	0.036	-0.039	-0.183	0.251	0.549
21	0.126	0.109	-0.174	0.188	0.787	0.184	0.059	0.057	-0.351	-0.127
22	0.222	0.556	0.577	0.175	-0.001	-0.130	-0.039	0.002	-0.026	-0.043
23	0.472	-0.514	0.276	0.106	0.050	-0.031	0.006	0.075	0.046	-0.007
24	0.440	0.099	-0.301	0.239	-0.267	0.004	0.040	-0.051	-0.144	0.111
25	0.411	-0.427	0.221	0.040	0.036	-0.009	-0.010	-0.527	-0.034	-0.137
26	0.429	-0.484	0.270	0.091	0.043	-0.020	0.005	-0.055	-0.000	-0.077
27	0.349	0.111	-0.380	0.497	-0.328	0.028	0.121	0.024	-0.241	-0.120
28	0.395	-0.440	0.248	0.096	0.030	-0.021	0.028	0.538	0.038	0.103
29	0.350	0.137	-0.222	-0.420	-0.045	-0.034	-0.353	0.114	-0.080	-0.194
30	0.224	0.123	0.149	-0.303	-0.123	0.678	0.468	0.040	0.017	0.026
31	0.257	0.445	0.450	0.108	0.011	-0.112	-0.035	0.006	-0.023	0.021
32	0.254	0.171	-0.274	0.260	0.162	0.096	0.034	0.017	0.609	-0.266
33	0.303	0.146	-0.199	-0.182	0.036	-0.177	0.065	0.031	0.087	-0.153

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TABLE XI
Factor Analysis - Extraverts

Eigenvalues	3.997	2.803	2.707	2.177	1.952	1.895	1.753	1.239	1.144	1.068
Proportion of Total Communality Accounted for by Factor	0.121	0.085	0.082	0.066	0.059	0.057	0.053	0.038	0.035	0.032
Principal Components	1	2	3	4	5	6	7	8	9	10
1	0.324	-0.194	-0.316	-0.224	-0.012	0.105	0.009	0.612	0.014	0.084
2	0.124	-0.081	-0.183	0.003	0.727	0.524	0.079	-0.194	-0.049	0.078
3	0.398	-0.033	0.437	-0.088	0.067	-0.020	-0.064	0.058	-0.383	-0.170
4	0.346	-0.257	-0.408	-0.390	-0.239	0.027	-0.077	-0.201	-0.095	0.076
5	0.498	-0.018	0.128	0.131	0.019	-0.086	-0.069	-0.094	0.277	-0.229
6	0.199	0.636	-0.148	-0.154	0.068	-0.060	-0.009	0.006	0.010	0.048
7	0.489	-0.011	0.479	-0.056	0.011	0.051	-0.017	0.021	0.330	0.357
8	0.168	0.686	-0.165	-0.142	0.037	-0.043	-0.035	0.007	-0.020	0.023
9	0.522	0.011	0.300	-0.026	0.064	-0.096	-0.016	-0.067	0.050	-0.314
10	0.366	-0.254	-0.364	-0.381	-0.245	-0.006	-0.050	-0.289	-0.034	-0.005
11	0.249	0.163	-0.108	0.388	-0.215	0.206	-0.022	0.002	-0.177	-0.020
12	0.153	0.654	-0.177	-0.154	0.077	-0.091	-0.049	0.012	0.007	0.008
13	0.287	-0.032	-0.206	0.490	-0.048	-0.126	-0.360	-0.052	-0.229	0.411
14	0.491	-0.022	-0.119	0.463	0.052	-0.149	-0.186	-0.066	0.157	-0.224
15	0.285	-0.074	-0.129	0.168	0.118	-0.416	0.755	-0.039	-0.086	0.121
16	0.214	0.188	0.037	0.276	-0.464	0.598	0.309	0.003	-0.152	-0.118
17	0.268	-0.103	-0.249	0.164	0.334	0.114	0.004	0.027	0.173	-0.331
18	0.349	-0.015	-0.241	0.485	0.103	-0.134	-0.269	0.011	0.089	-0.219
19	0.268	-0.077	-0.144	0.169	0.112	-0.418	0.757	-0.017	-0.082	0.111
20	0.401	-0.157	-0.105	-0.194	-0.125	-0.021	-0.020	-0.118	0.074	-0.077
21	0.143	-0.096	-0.194	-0.047	0.701	0.521	0.082	-0.199	-0.085	0.122
22	0.213	0.778	-0.170	-0.166	0.031	-0.036	-0.015	-0.004	-0.009	0.036
23	0.506	-0.021	0.533	-0.152	0.094	-0.023	-0.047	0.056	-0.173	0.069
24	0.428	-0.205	-0.312	-0.292	-0.196	-0.034	-0.021	-0.245	0.019	-0.053
25	0.473	-0.017	0.354	0.004	-0.087	0.159	0.080	-0.024	0.548	0.273
26	0.476	-0.028	0.499	-0.104	0.081	-0.013	-0.040	0.058	-0.043	0.150
27	0.404	-0.258	-0.367	-0.359	-0.179	0.010	-0.034	-0.099	-0.044	0.027
28	0.421	-0.032	0.475	-0.164	0.108	-0.051	-0.056	0.046	-0.469	-0.169
29	0.318	-0.061	-0.216	0.475	-0.018	-0.148	-0.336	-0.045	-0.202	0.368
30	0.241	0.206	0.019	0.291	-0.487	0.620	0.315	-0.005	-0.031	-0.019
31	0.203	0.639	-0.130	-0.171	0.076	-0.082	-0.024	-0.022	0.020	0.001
32	0.279	-0.184	-0.324	-0.165	0.063	0.164	-0.051	0.689	0.005	0.040
33	0.317	-0.039	-0.279	0.154	0.100	-0.126	0.106	0.255	0.051	-0.165

TABLE XII
Factor Analysis - Introverts

		Criterion = 212.27539.									
		df Total Communality Accounted for by Factor									
		Rotation Number									
		4 Criterion = 8									
Factor Pattern		1	2	3	4	5	6	7	8	9	10
0.013	0.041	0.096	0.015	0.007	0.001	0.026	0.099	-0.018	0.855		
0.009	0.026	0.001	0.017	0.016	0.006	0.007	0.935	0.112	0.038		
0.028	0.037	0.021	0.789	0.016	0.027	-0.022	-0.017	0.035	0.000		
0.004	0.033	0.812	0.010	-0.017	-0.005	-0.009	0.033	-0.053	0.086		
0.000	0.308	0.042	0.176	0.469	0.015	0.058	0.005	0.068	-0.064		
0.739	-0.015	0.007	0.004	0.010	0.047	0.001	0.006	-0.045	0.012		
0.028	0.022	0.002	0.096	0.849	0.074	-0.011	-0.003	0.026	0.017		
0.742	0.007	-0.007	0.013	-0.003	0.015	-0.008	0.000	0.016	0.122		
0.010	0.109	0.094	0.537	0.197	-0.004	0.059	0.018	0.035	0.010		
0.004	0.062	0.702	0.016	-0.008	0.012	0.032	-0.024	0.162	0.042		
0.179	0.347	0.014	-0.028	0.067	0.458	0.008	-0.016	0.019	0.004		
0.660	0.080	0.003	-0.010	0.002	0.048	0.009	-0.000	0.083	0.006		
0.012	0.791	0.027	0.024	-0.004	0.015	-0.044	0.001	-0.079	0.020		
0.033	0.633	0.153	0.083	0.107	0.076	0.099	-0.004	0.173	0.027		
0.003	-0.001	0.017	0.019	-0.002	0.602	0.949	0.009	0.009	0.000		
0.003	-0.039	0.004	0.008	0.003	0.928	-0.005	0.006	-0.016	0.000		
0.004	0.113	-0.015	-0.006	-0.027	-0.002	0.023	0.197	0.832	0.077		
0.012	0.667	0.009	-0.023	-0.004	0.014	0.029	0.020	0.236	0.016		
0.003	0.081	0.007	0.009	0.017	0.010	0.944	-0.000	0.021	-0.017		
0.076	0.104	0.257	0.080	0.116	0.031	0.016	-0.044	0.764	0.089		
0.007	0.006	0.021	-0.004	-0.004	-0.003	0.007	0.939	0.034	0.098		
0.861	-0.020	0.010	-0.003	-0.001	0.010	-0.004	0.002	-0.032	0.015		
0.002	-0.028	0.003	0.599	0.473	-0.010	-0.001	-0.001	0.020	0.030		
0.024	0.149	0.626	0.059	0.081	0.029	0.037	-0.032	0.178	0.002		
0.002	-0.019	0.027	0.077	0.834	-0.006	0.002	0.003	0.020	0.004		
0.004	-0.030	0.006	0.463	0.543	-0.006	-0.005	0.013	-0.033	0.018		
0.003	-0.003	0.837	0.035	0.011	-0.014	-0.002	0.049	-0.078	0.109		
0.003	-0.010	-0.003	0.849	0.056	0.021	0.000	0.008	-0.007	-0.011		
0.003	0.739	0.027	0.021	0.001	-0.004	-0.016	0.011	-0.060	0.028		
0.003	0.013	0.009	0.050	-0.022	0.932	0.016	0.000	0.033	0.009		
0.042	0.034	0.018	0.039	0.019	0.022	0.022	0.007	0.041	-0.008		
0.703	0.040	0.124	0.002	-0.018	0.009	-0.011	0.029	0.172	0.816		
0.015	0.360	0.107	0.022	0.036	0.009	0.298	0.022	0.035	0.212		



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Widow's Tears

TABLE XIII

Factor Analysis - Extraverbs

Criterion = 256.06272				Rotation Number 5 Criterion = 767									
n of Total Communality Accounted for by Factor													
	0.085	0.077	0.075	0.061	0.059	0.058	0.057	0.056	0.053	0.047			
Factor Pattern													
1	2	3	4	5	6	7	8	9	10				
0.004	0.230	0.022	0.010	0.018	0.022	0.034	0.054	0.014	0.792				
0.004	-0.008	0.002	-0.000	0.069	0.951	-0.001	0.009	-0.003	0.034				
-0.014	0.019	0.734	0.054	0.057	-0.007	-0.009	0.000	0.009	0.010				
0.002	0.772	-0.014	0.004	-0.067	0.030	-0.011	-0.038	0.085	0.113				
0.039	0.138	0.197	0.030	0.522	-0.048	0.026	0.304	0.085	0.113				
0.705	0.010	0.014	0.021	0.012	0.015	0.026	0.032	0.011	-0.062				
0.020	0.020	0.303	0.004	0.007	0.011	0.007	0.783	0.073	0.017				
0.740	-0.006	0.002	0.055	0.005	-0.006	-0.013	-0.017	0.018	0.025				
0.069	0.123	0.484	0.019	0.406	-0.041	0.046	0.200	0.018	0.006				
-0.004	0.789	-0.005	0.001	0.011	0.009	0.009	-0.011	0.019	-0.071				
0.094	-0.011	0.041	0.480	0.175	-0.017	-0.001	-0.061	0.309	0.013				
0.721	-0.005	-0.012	-0.017	0.032	-0.005	-0.005	-0.023	0.006	0.012				
0.004	0.045	0.002	0.046	0.115	-0.004	0.006	0.023	0.849	0.015				
0.023	0.067	0.066	0.071	0.696	-0.030	0.059	0.094	0.310	-0.024				
0.008	0.059	0.035	0.008	0.073	0.011	0.949	0.031	0.024	0.006				
0.023	0.015	0.052	0.926	-0.006	0.004	0.008	0.028	-0.045	0.006				
-0.016	0.059	-0.045	0.002	0.540	0.325	0.042	-0.051	-0.073	0.153				
0.026	0.004	-0.028	0.022	0.657	0.005	-0.013	-0.060	0.365	0.052				
0.004	0.052	0.018	0.007	0.075	0.000	0.947	0.016	0.015	0.027				
0.001	0.460	0.119	0.019	0.166	-0.021	0.029	0.134	-0.030	0.050				
0.008	0.046	0.022	-0.003	0.012	0.946	0.007	0.012	0.014	0.048				
0.839	0.005	0.010	0.082	0.002	-0.003	0.001	0.014	0.009	-0.002				
0.028	0.037	0.704	-0.018	-0.008	0.018	0.021	0.335	0.037	0.031				
0.026	0.699	0.030	0.016	0.124	0.002	0.054	0.038	0.011	0.023				
-0.002	0.075	0.075	0.137	0.127	0.004	0.020	0.846	-0.042	0.012				
0.012	0.014	0.574	-0.024	-0.002	0.016	0.026	0.432	0.062	0.037				
0.001	0.704	0.029	-0.006	0.019	0.032	0.037	0.007	0.039	0.196				
0.007	0.045	0.834	0.007	0.007	0.015	0.013	-0.033	-0.005	0.003				
-0.007	0.067	0.012	0.019	0.165	0.007	0.037	0.026	0.809	0.033				
0.046	0.028	-0.038	0.937	-0.010	0.006	0.011	0.160	-0.017	0.014				
0.710	0.021	0.034	-0.003	0.042	0.006	0.012	0.024	-0.019	-0.016				
-0.007	0.131	0.013	0.012	0.064	0.076	-0.037	0.004	0.024	0.851				
0.067	0.066	-0.010	0.018	0.384	0.008	0.243	-0.063	0.061	0.334				

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THE UNIVERSITY OF CHICAGO

PROJ. 70206: X-1125V

TABLE XIV
Comparing Common Factors

Factor 1 i X 1 e (external-natural & esthetics) Coefficient of Congruence = .996			
Apriori Class	Variable Number	Word	Loading (varimax) i e
e	6	paintings	.739
e	8	trees	.705
e	12	flowers	.742
e	22	landscape	.660
e	31	sky	.861
			.703
Factor differences greater than .05 showing the direction of difference			
Apriori Class	Variable Number	Word	
e	11	sidewalks	.085
i	20	boredom	.075
e	12	flowers	.061
i	9	thought	.059
Factor 2 i X 9 e (external - coded) Coefficient of congruence = .877			
Apriori Class	Variable Number	Word	
e	5	discussions	.33
e	11	sidewalks	.33
e	13	cars	.77
e	14	people	.66
e	18	dances	.66
e	29	sports	.33
i	33	passion	.33
Factor 3 i X 2 e (internal gut and desynchronization) Coefficient of Congruence = .975			
Apriori Class	Variable Number	Word	Loading (Varimax) i e
i	4	nervousness	.812
i	10	frustration	.702
i	20	boredom	.699
i	24	confusion	.626
i	27	anxiety	.837
Factor differences greater than .05 showing the direction of difference			
Apriori Class	Variable Number	Word	
i	27	anxiety	.133
e	14	people	.086
i	20	boredom	.203
e	5	discussions	.136
i	1	pain	.134
i	10	frustration	.087
e	17	drinks	.074
i	24	confusion	.073
Factor 4 i X 3 e (internal thought) Coefficient of Congruence = .965			
Apriori Class	Variable Number	Word	
i	3	papers	.33
e	7	university	.33
i	9	thought	.33
i	23	studies	.33
e	26	scholarship	.33
i	28	books	.33
Factor differences greater than .05 showing the direction of difference			
Apriori Class	Variable Number	Word	
e	30	buildings	.33
i	3	papers	.33
i	9	thought	.33
e	7	university	.33
e	26	scholarship	.33
i	23	studies	.33
e	11	sidewalks	.33

TABLE XIV
Comparing Common Factors

Factor 5 i X 8 e (external - interpersonal thought)
Coefficient of Congruence = .973

Factor 6 i X 4 e (external - coded)
Coefficient of congruence = .989

Apriori Class	Variable Number	Word	Loading (varimax) i e
e	5	discussions	.469
e	7	universities	.304
i	23	studies	.783
e	25	lectures	.473
e	26	scholarship	.834
			.543
			.432

Apriori Class	Variable Number	Word	Load i
e	11	sidewalks	.45
e	16	architecture	.92
e	30	buildings	.93

Apriori Class	Variable Number	Word	Factor differences greater than .05 showing the direction of difference
e	5	discussions	.165
i	23	studies	.138
e	11	sidewalks	.128
e	26	scholarship	.111
i	33	passion	.099
i	28	books	.089
e	7	universities	.066
e	18	dances	.056
e	30	buildings	.138

Apriori Class	Variable Number	Word	Factor greater showing of d
e	7	universities	.07
e	12	flowers	.06
e	25	lectures	
e	22	landscape	

Factor 7 i X 7 e (external - coded normative)
Coefficient of Congruence = .996

Factor 8 i X 6 e (internal - sensation)
Coefficient of Congruence = .991

Apriori Class	Variable Number	Word	Loading (varimax) i e
e	15	morality	.949
e	19	decency	.944
			.947

Apriori Class	Variable Number	Word	Load i
e	2	food	.93
i	21	hunger	.93
i	17	drinks	

Apriori Class	Variable Number	Word	Factor differences greater than .05 showing the direction of difference
i	33	passion	.055
e	29	sports	.053
e	13	cars	.050

Apriori Class	Variable Number	Word	Factor greater showing of d
i	9	thought	.05
i	1	pain	.05
e	5	discussions	.05
i	17	drinks	

Factor 10 i x 10 e (Internal - sensations discomfort)
Coefficient of Congruence = .984

Other comparisons not meeting the

Apriori Class	Variable Number	Word	Loading (varimax) i e
i	1	pain	.855
i	32	nausea	.816 1/2
i	33	passion	.792
			.851
			.334

Factor

9 i X 5 e
9 i X 9 e
2 i X 5 e

Apriori Class	Variable Number	Word	Factor differences greater than .05 showing the direction of difference
i	9	thought	.081
i	1	pain	.063
i	33	passion	.122
i	27	anxiety	.087
i	17	drinks	.076

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Only those factors which showed a coefficient of congruence above .800 were retained for more detailed comparison. Then all variables showing factor loadings above .300 for each sample were presented. These variables were designated as being representative of either the external (e) or internal (i) ecology in terms of the initial apriori classification. These same variables formed the basis for the naming of the factor as being either external or internal referent oriented. Further naming was made in terms of the most frequently occurring sub group of ecological symbol in the set.

Finally, factor loading differences greater than .05 were listed indicating also the direction of this difference.

Observing the coefficients of overlap for the compared factors it is obvious that the emergent dimensions are essentially similar for the two samples. Nine out of ten of the factors are directly comparable on the basis of a criterion of being related above .800 on these coefficients. This data can be taken as an essential confirmation of hypothesis I.

The first observation to be made with reference to hypothesis II is that of the words which have loadings above .300 on comparable factors, only four or 11.7% (2e's and 2i's) of those words were initially classified opposite to the direction of the named factor (external or internal factor cluster). Examining these words more closely on Factor 2i x 9e, external coded, the word passion (initially classified introverted) falls above the criterion of .300 for in-

Only those factors which showed a coefficient of congruence

above .800 were retained for more detailed comparison. Then all

variables showing factor loadings above .700 for each sample were

presented. These variables were designated as being representative

of either the external (e) or internal (i) ecology in terms of the

initial a priori classification. These same variables formed the basis

for the naming of the factor as being either external or internal re-

ferent oriented. Further naming was made in terms of the most pred-

ominantly occurring sub group of ecological symbol in the text.

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Observing the coefficients of overlap for the two samples fac-

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directly comparable on the basis of a criterion of being related above

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confirmation of hypothesis I.

The first observation to be made with reference to hypothesis

II is that of the words which have loadings above .700 on comparable

factors, only four or 11.7% (2's and 1's) of these words were ini-

tially classified opposite to the direction of the named factor

(external or internal factor cluster). Examining these words more

closely on Factor II, external coded, the word passion (initial-

ly classified introverted) falls above the criterion of .300 for in-

troverts. On factor 4i x 3e, internal thought, the words university and thought fall above the criteria with both of these differences across samples being in favor of the extraverted sample. On factor 5i x 8e, external interpersonal thought, the word studies appears in a similar light. Certainly the referential nature of these particular words is controversial, indeed it seems, in particular, as though these words may form links between an internal oriented type of thinking and an external social oriented kind of thinking.

In comparing the emergent factors with the initial classification there is some splitting and lumping that seems to have occurred. First, external natural and esthetics tend to be lumped together in one factor, (1i x 1e) as are coded structures and coded interpersonal stimulation (2i x 9e) although coded interpersonal seems to emerge later, (5i x 8e) in relation to thought, and coded structures later emerges more independently (6i x 4e). The normative factor remains independent (7i x 7e).

Secondly, internal gut and cortical desynchronization symbols are lumped (3i x 2c) whereas internal thought (4i x 3e) and internal sensations (8i x 6e) remain fairly independent.

The preceding data may be taken as a general confirmation of hypothesis II although it appears as though some revision of dimensions is in order. It appears as though there may not be as much differentiation within either internal or external referent systems (lumping) and as though there is more interrelation between them,

On factor 4 (x 3e), internal thought, the words university and thought fall above the criteria with both of these differences across samples being in favor of the extrarated sample. On factor 7 (x 8e), external interpersonal thought, the word studied appears in a similar light. Certainly the referential nature of these particular words is controversial, indeed it seems, in particular, as though these words may form links between an internal oriented type of thinking and an external social oriented kind of thinking.

In comparing the emergent factors with the initial classification there is some splitting and lumping that seems to have occurred. First, external natural and aesthetics tend to be lumped together in one factor, (11 x 1e) as are coded structures and coded interpersonal stimulation (21 x 9e) although coded interpersonal seems to emerge later, (71 x 8e) in relation to thought, and coded structures later emerges more independently (61 x 1e). The normative factor remains independent (71 x 7e).

Secondly, internal gut and cortical desynchronization symbols are lumped (21 x 2e) whereas internal thought (11 x 3e) and internal sensations (81 x 6e) remain fairly independent.

The preceding data may be taken as a general confirmation of hypothesis II although it appears as though some revision of dimensions is in order. It appears as though there may not be as much differentiation within either internal or external referent systems (lumping) and as though there is more interrelation between them.

e.g. external-interpersonal thought, (5i x 8e) and internal gut and desynchronization (3i x 2e).

Utilizing data from Table XIV, it was possible to set up a series of contingency tables that were considered as likely to be helpful in answering some of the questions posed in hypothesis III. These tables are essentially concerned with the question of differences (above .05) for variables on comparable factors. The differences are not noticeably large although there are a few of considerable magnitude (above .25), however this is a function of the overall similarity of the factors, a similarity that was in essence a part of the objective of the design.

Table XV includes the contingency tables used to test the hypothesis that the direction of differences will be in relation to the type of word or factor. Table XV (a) and XV (b) attempt to show whether or not a relation exists between the initial apriori classification of a word and the direction of the difference that word takes, when comparing common factors. Separate comparisons were made for external factors and for internal factors.

The question asked was, given an apriori class for a word, internal or external, which sample, introverts or extraverts will have a higher factor loading (above .05) for that word on a common factor? For example, it might have been expected that internal words would show higher factor loadings for introverts on common factors labelled as essentially dominated by internal words. The data in

e.g. external-introversion, thought, (51 x 8) and internal and desynchronization (21 x 26).

Utilizing data from Table XIV, it was possible to set up a series of contingency tables that were considered as likely to be helpful in answering some of the questions posed in hypothesis III. These tables are essentially concerned with the question of differences (above .05) for variables on comparable factors. The differences are not noticeably large although there are a few of considerable magnitude (above .25), however this is a function of the overall similarity of the factors, a similarity that was in essence a part of the objective of the design.

Table XV includes the contingency tables used to test the hypothesis that the direction of differences will be in relation to the type of word or factor. Table VI (a) and VII (b) attempt to show whether or not a relation exists between the initial apriori classification of a word and the direction of the difference that word takes, when comparing common factors. Separate comparisons were made for external factors and for internal factors. The question asked was, given an apriori class for a word,

internal or external, which sample, introverts or extraverts will have a higher factor loading (above .05) for that word on a common factor? For example, it might have been expected that internal words would show higher factor loadings for introverts on common factors labelled as essentially dominated by internal words. The data in

Tables XV (a) and XV (b) show no such relationship exists.

Essentially the same question was asked about the direction that the factor loading difference would take on common factors classified as either internal or external, this initial classification being based on words loaded above .300. For example, it might be expected that for common factors classified as internal the direction of the factor differences (above .05) on all of the words irrespective of their initial classification, internal or external, might favor the introverted sample (there would be higher factor loadings on all words for the introverted sample). This analysis also showed no relation between the factor classification and the sample direction of the differences, (Table XV (c)).

In the final analysis the factors were classified as being either internal or external and the words showing the largest differences (above .05), irrespective of the direction, were classified on the apriori designations. This analysis turned out to be significant ($p < .05$) for the sample of data available. What it means is that on a common factor classified internal, internal apriori classified words, form the basis for discriminating the samples. However, there were just as many differences on internal words favoring the extravert sample as the introvert sample (Tables XV a and XV b).

The foregoing conclusions apply the same for extraverted factors with extraverted words.

That is on an external factor, words referring to the same

Tables XV (a) and W (b) show no such relationship exists.

Essentially, the same question was asked about the direction

that the factor loading differences would take on common factors

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being based on words loaded above .300. For example, it might be ex-

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of the factor differences (above .05) on all of the words irrespec-

tive of their initial classification, internal or external, might

favor the introverted sample (there would be higher factor loadings

on all words for the introverted sample). This analysis also showed

no relation between the factor classification and the sample direction

of the differences. (Table IV (c)).

In the final analysis the factors were classified as being

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a common factor classified internal, internal apriori classified

words, form the basis for discriminating the samples. However, there

were just as many differences on internal words favoring the extrovert

sample as the introvert sample (Tables IV a and IV b).

The foregoing correlations apply the same for extroverted

factors with extroverted words.

That is on an external factor, words referring to the same

TABLE XV

(a) EXTERNAL FACTORS

Direction of the factor
loading difference for
common factors

Initial classification of the word	Introverted	Extraverted
internal	10	5
external	12	10

$$\begin{aligned} d.f. &= 1 \\ x^2 &= .54 \\ cv &= 3.84 \\ (p &< .05) \end{aligned}$$

(b) INTERNAL FACTORS

Direction of the factor
loading difference for
common factors

Initial classification of the word	Introverted	Extraverted
internal	8	9
external	4	3

$$\begin{aligned} d.f. &= 1 \\ x^2 &= .20 \\ cv &= 3.84 \\ (p &< .05) \end{aligned}$$

(c) COMMON INTERNAL OR
EXTERNAL FACTORS
ACROSS SAMPLESDirection of the factor
loading difference for
common factors

Classification of common factors	Introverted	Extraverted
internal	10	14
external	23	13

$$\begin{aligned} d.f. &= 1 \\ x^2 &= 2.88 \\ cv &= 3.84 \\ (p &< .05) \end{aligned}$$

(d) COMMON INTERNAL OR
EXTERNAL FACTORS
ACROSS SAMPLESClassification of words
on which differences occur
without regard to the
direction of the diff-
erence

Classification of common factors	Internal	External
internal	16	8
external	12	24

$$\begin{aligned} d.f. &= 1 \\ x^2 &= 6.43^* \\ cv &= 3.84 \\ (p &< .05) \end{aligned}$$

* indicates significance at the prescribed
probability level

TABLE XV

(a) EXTERNAL FACTORS
Direction of the factor loading difference for common factors

Initial classification of the word		Inverted Exchanged	
internal		10	2
external		12	10

$\Delta^2 = 1$
 $\chi^2 = 2.84$
cv = 3.84
(p > .05)

(b) INTERNAL FACTORS
Direction of the factor loading difference for common factors

Initial classification of the word		Inverted Exchanged	
internal		6	9
external		14	3

$\Delta^2 = 1$
 $\chi^2 = 2.84$
cv = 3.84
(p > .05)

(c) COMMON INTERNAL OR EXTERNAL FACTORS ACROSS SAMPLES
Classification of common factors

Inverted Exchanged		Internal	
10		14	10
12		13	10

$\Delta^2 = 1$
 $\chi^2 = 2.84$
cv = 3.84
(p > .05)

(d) COMMON INTERNAL OR EXTERNAL FACTORS ACROSS SAMPLES
Classification of common factors

Internal		External	
10		8	10
12		13	10

$\Delta^2 = 1$
 $\chi^2 = 2.84$
cv = 3.84
(p > .05)

* indicates significance at the prescribed probability level

reference area will be the most influential in discriminating, however nothing about the sample direction these differences will take can be predicted.

These data generally do not support hypothesis III, in terms of being able to predict the direction of the difference on the basis of knowing the apriori classification of the words or factors.

C. Comments on common factor comparisons.

The following comments are all based on the data of Table VII. Special emphasis is placed on the comparison of differences.

Factor li x le (external - natural and aesthetic)

It is interesting to note on this factor a tendency for boredom to be more highly related to this concept for introverts, while thought is more highly related for extraverts. It may be that extraverts are thoughtful about external objects, as Jung has suggested in his extraverted thinking type.

Factor 2i x 9e (external - coded)

This factor generally seems to separate out differences more than other factors. It appears to reflect a general people - situation sort of orientation. Introverts in this case seem more people oriented (people, discussions, dances, passion, drinks) and more closely oriented towards the variables of factor li x le, (flower, boredom and sky). The important variable explaining this introvert pattern is that for them thought is more closely allied with this whole concept. Extraverts on the other hand are more study oriented

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C. Comments on common factor correlations.

The following comments are all based on the data of Table

VII. Special emphasis is placed on the comparison of differences.

Factor I: I x Ie (external - natural and aesthetic)

It is interesting to note on this factor a tendency for boredom to be more highly related to this concept for introverts, while thought is more highly related for extraverts. It may be that extraverts are thoughtful about external objects, as Jung has suggested in his extraverted thinking type.

Factor II: I x Ie (external - coded)

This factor generally seems to separate out differences more than other factors. It appears to reflect a general people - situation sort of orientation. Introverts in this case seem more people oriented (people, discussions, dances, passion, drink) and more closely oriented towards the variables of factor I: I x Ie (flow, boredom and sky). The important variable explaining this introvert pattern is that for them thought is more closely allied with this whole concept. Extraverts on the other hand are more study oriented.

and perhaps more outdoor oriented on this factor.

Factor 3i x 2e (internal - gut and desynchronization)

Introverts associate anxiety and people more heavily on this concept. Extraverts on the other hand seem more spread out in their associates to this concept. They load more heavily on 3/5 of the variables defining the factor (frustration, boredom and confusion). This result tends to confirm the earlier analysis which showed more differentiations and interrelationships among words clustering around a similar such central concept, for the extravert sample.

Factor 4i x 3e (internal - thought)

This factor seems to represent a more bookish kind of thought concept, perhaps a more traditional type of university outlook. Introverts load more heavily on buildings, papers and thought. Extraverts on the other hand place more emphasis on university, scholarship, studies and sidewalks. These latter words seem more related to the following factor which seems to represent a more external sociable kind of thought concept.

Factor 5i x 8e (external - interpersonal thought)

This factor concept seems to emphasize a more sociable kind of learning. Introverts suprisingly score higher on almost all of the variables that show differences (8/9). This is a little difficult to explain. There are two major possibilities. Either the concept ought to be renamed as representing the way introverts tend to

and more outdoor oriented on this factor.

Factor 31 x 29 (internal - gut and gastrointestinal)

Introverts associate anxiety and people more heavily on this concept. Extraverts on the other hand seem more spread out in their association to this concept. They load more heavily on 3/5 of the variables defining this factor (irritation, boredom and confusion). This result tends to confirm the earlier analysis which showed more differentiations and interrelationships among words clustering around a similar such central concept, for the extravert sample.

Factor 31 x 30 (internal - thought)

This factor seems to represent a more bookish kind of thought concept, perhaps a more traditional type of university outlook. Introverts load more heavily on buildings, papers and thought. Extraverts on the other hand place more emphasis on university, scholarship, studies and sideways. These latter words seem more related to the following factor which seems to represent a more external sociable kind of thought concept.

Factor 31 x 32 (external - interpersonal thought)

This factor concept seems to emphasize a more sociable kind of learning. Introverts surprisingly score higher on almost all of the variables that show differences (3/9). This is a little difficult to explain. There are two major possibilities, either the concept ought to be renamed as representing the way introverts tend to

think, or the differences favoring introverts may represent strong negative associations with the concepts under consideration. The directions of the test suggested choosing the strongest associate, not the strongest positive associate. This latter explanation may be a real possibility that could be checked out in a design emphasizing both responses to each stimulus word, e.g. strongest positive and strongest negative associate.

Factor 61 x 4e (external - coded structures)

The word lectures is more strongly associated for extraverts on this factor possibly suggesting a more people oriented concept of these university oriented coded structures, or a stronger information type of interest about external coded structures.

Factor 7i x 7e (external - coded normative)

A kind of interesting difference emerges here in that introverts are slightly more concept passion oriented whereas extraverts are more situation oriented.

Factor 8i x 6e (internal - sensations comfort)

This factor may suggest that introverts hold a more negative abstract view of their sensations (thought and pain), while extraverts view their internal sensations as more related to social, good time situations.

Factor 10i x 10e (internal - sensations discomfort)

Again for introverts thought and pain are more closely associated on this factor, while for extraverts it may be a more

think, or the differences favoring introverts may represent strong negative associations with the concepts under consideration. The directions of the test suggested choosing the strongest associate, not the strongest positive associate. This latter explanation may be a real possibility that could be checked out in a design experiment, e.g. strongest positive and strongest negative associate.

Factor 61 x 6e (external - coded structures)

The word lectures is more strongly associated for extraverts on this factor possibly suggesting a more people oriented concept of these university oriented coded structures, or a stronger information type of interest about external coded structures.

Factor 71 x 7e (external - coded normative)

A kind of interesting difference emerges here in that introverts are slightly more concept passion oriented whereas extraverts are more situation oriented.

Factor 81 x 8e (internal - sensations comfort)

This factor may suggest that introverts hold a more negative abstract view of their sensations (thought and pain). While extraverts view their internal sensations as more related to social, good time situations.

Factor 101 x 10e (internal - sensations discomfort)

Again for introverts thought and pain are more closely associated on this factor, while for extraverts it may be a more

social situational, (passion, drinks) concept.

Two final comments are in order about the nature of the interpretations in this section of the paper. The first is that the differences that emerge are generally very small and that it is a very dubious procedure in any case to attempt to compare factor loadings across samples, even though there may be a high relationship between the factors.

Secondly, that whatever interpretations justifiably emerge about differences between introverts and extraverts are limited to the way in which these types are defined by the Myers-Briggs type indicator.

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is a very dubious procedure in any case to attempt to compare

factor loadings across samples, even though there may be a high re-

lationship between the factors.

Secondly, that whatever interpretations (justifiably) emerge

about differences between introverts and extroverts are limited to

the way in which these types are defined by the Myers-Briggs type

indicator.

CHAPTER V

CONCLUSIONS AND SUGGESTIONS

A. Conclusions

Generally the nature of this study can be considered as having been more exploratory than definitive.

Summarizing the comparisons of the previous chapter certain expectations about the theoetical speculations on introversion - extraversion theory are confirmed as follows.

For introverts we find that, on factor comparisons 1i x 1e they associate boredom more strongly with this natural and aesthetic factor concept, on factor comparison 2i x 9e they see a people situation concept as more thought discussion related, on factor comparison 3i x 2e they associate more anxiety and people relations to an internal gut desynchronization concept, on factor comparison 4i x 3e they seem more traditional bookish-scholarly oriented to an internal thought concept, on factor comparison 7i x 7e they relate passion, a more internal abstract type of concept, more strongly to a normative-social concept, on factor comparison 8i x 6e they hold a more negative view of their internal comfort sensations and on factor comparison 10i x 10e they associate thought and pain more strongly with internal discomfort sensations.

For extraverts we find that: on factor comparison 2i x 9e they relate the outdoors and the natural world more to people situ-

CHAPTER V

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A. Conclusions

Generally the nature of this study can be considered as

having been more exploratory than definitive.

Summarizing the comparisons of the previous chapter certain

expectations about the theoretical speculations on introversion -

extraversion theory are confirmed as follows.

For introverts we find that, on factor comparisons 11 x 12

they associate boredom more strongly with this natural and aesthetic

factor concept, on factor comparison 21 x 22 they see a people situ-

ation concept as more thought discussion related, on factor comparison

31 x 32 they associate more anxiety and people relations to an inter-

nal but desynchronization concept, on factor comparison 41 x 42 they

seem more traditional bookish-scholarly oriented to an internal

thought concept, on factor comparison 71 x 72 they relate passion,

a more internal abstract type of concept, more strongly to a normative-

social concept, on factor comparison 81 x 82 they hold a more negative

view of their internal comfort sensations and on factor comparison

101 x 102 they associate thought and pain more strongly with internal

discomfort sensations.

For extraverts we find that: on factor comparison 21 x 22

they relate the outdoors and the natural world more to people situ-

ations, on factor comparison 4i x 3e they seem more social situation oriented about internal thought, on factor comparison 6i x 4e they are more people-thought oriented about external man made structures, on factor comparison 7i x 7e they see normative behavior as centered more strongly about external social kinds of concepts, on factor comparison 8i x 6e internal sensations are more social - good time related, and on factor comparison 10i x 10e they relate social situations or social problems more strongly to an internal sensation - discomfort concept.

There are other relationships which emerge from the comparison data which would tend to disconfirm what might have been logically expected from introversion - extraversion theory.

For introverts they are: on factor comparison 2i x 9e more people situation oriented in general, and on factor comparison 5i x 8e introverts load higher on 8 out of 9 of the variables showing differences on the external interpersonal thought factor.

For extraverts they are on factor comparison 1i x 1e more thought oriented than introverts to an external-natural-aesthetic concept, on factor comparison 2i x 9e they are more study oriented to people situations and on factor comparison 3i x 2e they load heavily on 3 out of 5 of the major variables defining an internal gut-desynchronization concept.

At a more abstract level there appeared to be three major incongruencies with introversion-extraversion theory. The first

on factor comparison 11 x 12 they see more social situation oriented about internal thought, on factor comparison 61 x 12 they are more people-thought oriented about external man made structures, on factor comparison 71 x 12 they see normative behavior as centered more strongly about external social kinds of concepts, on factor comparison 81 x 12 internal sensations are more social - good time related, and on factor comparison 101 x 12 they relate social situations or social problems more strongly to an internal sensation - discomfort concept.

There are other relationships which emerge from the comparison data which would tend to disconfirm what might have been logically expected from introversion - extraversion theory.

For introverts they are: on factor comparison 21 x 12 more people situation oriented in general, and on factor comparison 31 x 12 introverts load higher on 8 out of 9 of the variables showing differences on the external interpersonal thought factor.

For extraverts they are on factor comparison 11 x 12 more thought oriented than introverts to an external-natural-aesthetic concept, on factor comparison 21 x 12 they are more study oriented to people situations and on factor comparison 31 x 12 they load heavily on 3 out of 5 of the major variables defining an internal gut-desynchronization concept.

At a more abstract level there appeared to be three major incongruencies with introversion-extraversion theory. The first

was that extraverts seemed to be much more internal gut response and cortical desynchronization oriented than might have been predicted. The second was that extraverts tended to be somewhat more study and thought oriented than might have been predicted. However this latter emphasis was a more people involved kind of study orientation. Most of the factors were more interpersonal related for the extravert sample. The third was that introverts are more people and people-thought oriented than might have been predicted. The latter two discrepancies are obviously related and seem to suggest that thought and people concepts are not by themselves essential to describing differences between these personality types.

Essentially the research reported in this study was quite successful in achieving the initial goals and purposes set forth in the introductory chapter. Hypothesis I was confirmed in that basically comparable factors emerged after varimax rotation. Hypothesis II was basically confirmed although some reorganization of the initially proposed ecological-environmental stimulus areas occurred. Hypothesis III was partially confirmed and partially disconfirmed. The direction of the factor differences across samples was not predictable from the apriori classifications of words or factors. However, it was demonstrated that apriori labelled words (internal-external) when congruent with the factor label are the best discriminators of differences across samples when the directions of the differences are ignored. Further, the comparison data available in the latter sections of the paper suggest that such a

was that extraverts seemed to be much more internal but response and cortical desynchronization oriented than might have been predicted. The second was that extraverts tended to be somewhat more study and thought oriented than might have been predicted. However, this latter emphasis was a more people involved kind of study

orientation. Most of the factors were more interpersonal related for the extravert sample. The third was that introverts are more people and people-thought oriented than might have been predicted. The latter two discrepancies are obviously related and seem to suggest that thought and people concepts are not by themselves essential to describing differences between these personality types.

Essentially the research reported in this study was quite successful in achieving the initial goals and purposes set forth in the introductory chapter. Hypothesis I was confirmed in that basically comparable factors emerged after varimax rotation. Hypothesis II was basically confirmed although some reorganization of the initially proposed ecological-environmental stimulus areas occurred. Hypothesis III was partially confirmed and partially disconfirmed. The direction of the factor differences across samples was not predictable from the a priori classifications of words or factors. However, it was demonstrated that a priori labelled words (internal-external) when congruent with the factor label are the best discriminators of differences across samples when the directions of the differences are ignored. Further, the comparison data available in the latter sections of the paper suggest that such a

measurement approach to individual differences does appear to aid in the clarification of personality differences and similarities. Further research is necessary to determine the ultimate usefulness of such an approach.

B. Implications

The implications of this study for the field of education are the possibility of predicting areas for academic interest and success through understanding individual differences. The author has attempted to demonstrate a conceptual structure measurement approach to individual differences and has tried to show logical and empirical evidence as to the effectiveness of such an approach.

The implications of this study for the study of human behavior more generally are perhaps more apparent. It represents somewhat of a different approach to the study of conceptual structure and individual differences combined. It suggests a possible means of relating conceptual structure with orientation to and reaction to, the environment. That is the study of coded symbolic or more general cognitive structure is likely to provide a means of linking the effects of past experiences, via mediated conceptual structure, to the more direct stimulus-response behavioral explanation of behavior. It could possibly provide a mediating link for the explanation of experience effects upon behavior. It also suggests a method of studying the development of conceptual structure, for example one could control certain kinds of environmental experiences and obtain records of conceptual structure changes.

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C. Suggestions

A possible excellent follow-up to this project would be to obtain a set of approximately 100 words representative of carefully chosen ecological areas. Then a large sample representative of the total range of personality behaviors could be obtained, and to whom the word set could then be given as an association test. It would be possible to have the subjects report both a strongest positive and a strongest negative association response. A single simple matrix could then be computed.

It would then be possible to reduce the matrix by subjects as opposed to the usual variable reduction method, so that emergent factors are groups of maximally independent subjects. The ordinary reduction, by variables(words) could be undertaken. The factor scores for individuals in the most diverse groups could be obtained in order to focus upon personality differences. Norms could be established on each of the factors for each of the groups. Patterns of associational structure could be compared for the various groups. Such a project might result in a useful instrument for differentiating personality types.

These differing groups could be utilized to obtain data from different kinds of established personality measures. Such relationships as could emerge would enhance the validation of the nature of the differentiated groups. Also once a pattern of characteristics emerges for the groups, subsequent measures of cog-

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relative structure could be used as intervening independent variables in the prediction of behavior.

The following is a summary of the results of the study. The first part of the study was a pilot study which was designed to determine the feasibility of the study. The results of the pilot study were that the study was feasible and that the subjects were able to perform the tasks. The second part of the study was a main study which was designed to determine the effects of the independent variables on the dependent variables. The results of the main study were that the independent variables had significant effects on the dependent variables. The third part of the study was a conclusion which was based on the results of the main study. The conclusion was that the independent variables had significant effects on the dependent variables and that the study was successful.

BIBLIOGRAPHY

1. Bannister, D., "Personal construct theory; A summary and experimental paradigm," Acta Psychologica, Amsterdam, 1962, 20(2) 104-120
2. Barker, Roger D., "On the nature of the environment", Journal of Social Issues, 1963, 19 (4) 17-38
3. Block, J., "Commonality in word association and personality", Psychological Reports, 1960, 7, 332
4. Bousfield, W.A., "The occurrence of clustering in the recall of randomly arranged associates," Journal of General Psychology, 1953, 49, 229-240.
5. Bousfield, W.A., "Associative clustering in the recall of minimally meaningful geometric designs," Canadian Journal of Psychology 1959, 13, 281-87.
6. Bousfield, W.A., Whitmarsh G.A., and Berkowitz H., "Partial response identities in associative clustering", Journal of General Psychology, 1960, 63, 233-238.
7. Bousfield, W.A., Esterson J., and Whitmarsh G.A., "A study of developmental changes in conceptual and perceptual associative clustering". Journal of Genetic Psychology, 92, 95 - 102
8. Bousfield, W.A., Steward, J.R., and Cowan F.M., "The use of free associational norms for the prediction of clustering". Journal of General Psychology 1964, 70 (2) 205-214
9. Bruner, Jerome S., "On perceptual readiness". Psychological Review, 64 (2) 1957, pp 123-152.
10. Carrigan, Patricia M. "Extraversion - Introversion as a dimension of personality: A reappraisal." Psychological Bulletin 1960, 57 (5) pp. 329 - 360
11. Cassirer, E., The philosophy of symbolic forms, New Haven, Yale U. Press., 1953.
12. Corah, Norman L., "Neuroticism and Extraversion in the M.M.P.I. Empirical validation and exploration", British Journal of Social and Clinical Psychology, 1964 3 (3) 168-174
13. Couch, A., and Keniston, K., "Yeasayers and Naysayers", Journal of Abnormal and Social Psychology, 1960, 60, 151-173.
14. Deese, J., "Frequency of usage and number of words in free recall: The role of association," Psychological Reports, 1960, 7, 337-344.

BIBLIOGRAPHY

1. Benninger, D., "Personal construct theory: A summary and experimental paradigm," Acta Psychologica, Amsterdam, 1962, 20(2) 101-120.
2. Barker, Roger D., "On the nature of the environment," Journal of Social Issues, 1963, 19 (4) 17-38.
3. Block, J., "Commonality in word association and personality," Psychological Reports, 1960, 7, 332.
4. Borsfield, W.A., "The occurrence of clustering in the recall of randomly arranged associates," Journal of General Psychology, 1953, 49, 229-240.
5. Borsfield, W.A., "Associative clustering in the recall of minimally meaningful geometric designs," Canadian Journal of Psychology, 1959, 13, 281-87.
6. Borsfield, W.A., Whitmarsh G.A., and Berkowitz H., "Partial response identities in associative clustering," Journal of General Psychology, 1960, 63, 233-238.
7. Borsfield, W.A., Esterson J., and Whitmarsh G.A., "A study of developmental changes in conceptual and perceptual associative clustering," Journal of Genetic Psychology, 92, 95 - 102.
8. Borsfield, W.A., Steward J.R., and Cowan F.M., "The use of free associational norms for the prediction of clustering," Journal of General Psychology, 1961, 70 (2) 205-214.
9. Bruner, Jerome S., "On perceptual readiness," Psychological Review, 64 (2) 1957, pp 123-152.
10. Gargan, Patricia M., "Extraversion - Introversion as a dimension of personality: A reappraisal," Psychological Bulletin, 1960, 57 (2) pp. 329 - 350.
11. Cassirer, E., The philosophy of symbolic forms, New Haven, Yale U. Press, 1953.
12. Gersh, Norman L., "Neuroticism and Extraversion in the M.M.P.I. Empirical validation and exploration," British Journal of Social and Clinical Psychology, 1961, 3 (2) 168-174.
13. Couch, A., and Keniston K., "Yeasayers and Naysayers," Journal of Abnormal and Social Psychology, 1960, 60, 151-153.
14. Deese, J., "Frequency of usage and number of words in free recall: The role of association," Psychological Reports, 1960, 7, 337-344.

15. Deese, James, "On the structure of associative meaning", Psychological Review, 1962, 69 (3) pp 161 - 175.
16. Deutsch, J.A., and Deutsch, D., "Some theoretical considerations", Psychological Review, 1963, 70, (1) 80-90
17. Dicks - Mieaux, M.J., "Extraversion - Introversion in experimental Psychology", Journal of Analytical Psychology, 1964, 9 (2) 117-128.
18. Dowdy, Charles Daniel, "An experimental test of Eysenk's and Cottell's theories of introversion - extraversion". Dissertation Abstracts, 1960 (Feb) 20 #3376.
19. Endler, Norman S., "Changes in meaning during psychotherapy as measured by the semantic differential," Journal of Counseling Psychology, 1961, 8, 105 - 111.
20. Eysenck, Hans Jergen, The Structure of human personality, London, Methuen, 1953.
21. Eysenck, Hans Jurgen, Experiments in personality, London, Routledge and Kegan Paul, 1960.
22. Eysenck, S.B. J. and Eysenck H. J., "On the dual nature of extroversion." British Journal of Social and Clinical Psychology. 1962 (2) 46 - 35.
23. Eysenck, S. B. J. and Eysenck H. J., "The validity of questionnaire and rating assessments of extroversion and neuroticism and their factorial stability", British Journal of Psychology, 1963, 54 (1) 51 - 62.
24. Field, S.P., and Landfield A.W., "Personal Construct consistency", Psychological Reports, 1961, 8 127 - 129.
25. Flaugher, R.L., "Deduction value: A measure of verbal relatedness applied to free association," Dissertation Abstracts, 1964 (24) #5564.
26. Flavell, John H. (ed.), The developmental psychology of Jean Piaget, Princeton N.J., D. Van Nostrand Company Inc., 1963.
27. Garskoff, Bertram E., and Houston John P., "Measurement of verbal relatedness: On idographic approach", Psychological Review, 1963 70 (3) 277-88.
28. Gibson, J. J., "Perception as a function of stimulation", In Koch, S. (ed), Psychology a Study of Science, New York, McGraw Hill, 1959, vol 1, pp 456 - 501.

15. Deane, James, "On the structure of associative learning", Psychological Review, 1902, 9 (2) 20-30 - 21.
16. Deane, J. J. and Havelock, J. "The theoretical considerations", Psychological Review, 1902, 9 (1) 1-10.
17. Deane, J. J., "Interference - a contribution to experimental psychology", Journal of Experimental Psychology, 1901, 2 (2) 117-122.
18. Dwyer, Charles Daniel, "An experimental test of Yerkes' and Dwyer's theories of interference - a contribution", Dissertation, 1900 (Ph.D.) 1-337.
19. Ebbinghaus, Hermann, "Changes in verbal behavior as measured by the semantic differential", Journal of Experimental Psychology, 1901, 2 (1) 1-11.
20. Eysenck, Hans J., The structure of human personality, London, Methuen, 1953.
21. Eysenck, Hans J., Personality in psychology, London, Methuen, 1960.
22. Eysenck, H. J. and Eysenck, S. B., "The role of the semantic differential", British Journal of Medical and Psychological, 1952 (2) 14-22.
23. Eysenck, H. J. and Eysenck, S. B., "The validity of questionnaires and rating assessments of extraversion and neuroticism and their factorial stability", British Journal of Psychology, 1953, 44 (1) 51-62.
24. Eysenck, H. J. and Eysenck, S. B., "Theoretical considerations", Psychological Review, 1951, 58 127-132.
25. Eysenck, H. J., "Questionnaires: A review of verbal relationships applied to free association", Dissertation, 1901 (Ph.D.) 1-55.
26. Eysenck, H. J. (ed.), The development of personality, London, Methuen, 1963.
27. Eysenck, H. J., "Measurement of verbal relationships: An experimental approach", Psychological Review, 1953, 60 (2) 277-288.
28. Eysenck, H. J., "Personality as a function of stimulation", Journal of Experimental Psychology, 1953, 46 (1) 1-11.

29. Gibson, J. J., "The useful dimensions of sensitivity" American Psychologist, 1963, 18 1 - 15.
30. Hauron, M.D., Nordie R.G. and Coter, C.N., "Measurement of Attitudes by a simple word association technique", Journal of Social Psychology 1957 (Aug) 46 81-89
31. Heider, Fritz, "On perception, event structure, and psychological environment", Psychological Issues Vol 1, (3) 1959.
32. Hall, C.S., and Lindzey, G., Theories of personality, New York, Wiley, 1957
33. Harman, Harry, H., Modern factor analysis, Chicago, University of Chicago Press, 1960.
34. Harvey, O, Hunt, D.E., and Schroder, H.M., Conceptual systems and Personality Organization, New York, J. Wiley, 1961
35. Houston, John P., and Garskoff, B.E., "Clustering in recall as a function of associative overlap," Psychological Reports, 1963 (13) 3 699 - 701.
36. Hurst, John C., "Dimensions of personality adjustment in mental patients," Journal of Consulting Psychology 1963, 27 (5) 465.
37. Jenkins, J. J., and Russel, W.A., "Associative clustering during recall", Journal of Abnormal and Social Psychology, 1952, 47, 818 - 821.
38. Jenkins, P.M. and Coter, C.N., An exploratory Study of discrete free association to compound verbal stimuli, Psychological Reports, 1957, 599 - 602.
39. Johnson, Ronald C., and Lim, D., Personality variables in associative production. Journal of General Psychology, 1964, 72 (2) 349 - 50.
40. Jung, C.G., (trans, Baynes H.G.,) Psychological Types, New York, Harcourt Brace and Company, Inc., 1923
41. Kaiser, H.F., "Relating factors between studies based on different individuals," Unpublished paper, University of Illinois, 1960.
42. Kasselbaum, G. G., Couch, A.S., and Slater P.F., "The factorial dimensions of the M.M.P.I. Journal of Consulting Psychology, Vol 23, (3) 1959.
43. Kelly, George Alexander, The psychology of personal constructs, New York, Norton, 1955.

- 39. Glass, L. J., "The useful dimensions of sensitivity" Psychological Review, 1963, 70, 1-15.
- 40. Lanyon, R. D., Roodie, L. G., and Lanyon, R. D., "Measurement of individual differences in the association of verbal and visual material" Journal of Experimental Psychology, 1957 (Aug), 54, 81-89.
- 41. Lanyon, R. D., "On perception, event structure, and psychological environment" Psychological Review, Vol. 1, (3) 1960.
- 42. Lanyon, R. D., and Lanyon, R. D., Theories of personality, New York, Wiley, 1957.
- 43. Lanyon, R. D., Robert Lanyon's papers, Chicago, University of Chicago Press, 1960.
- 44. Lanyon, R. D., and Lanyon, R. D., Generalized states and personality organization, New York, Wiley, 1961.
- 45. Lanyon, R. D., and Lanyon, R. D., "Measurement in a field of function of associative variables" Psychological Review, 1958 (Aug), 65, 399-401.
- 46. Lanyon, R. D., "Dimensions of personality adjustment in normal patients" Journal of Consulting Psychology, 1959, 27 (3), 195.
- 47. Lanyon, R. D., and Lanyon, R. D., "Associative clustering during recall" Journal of Experimental and Social Psychology, 1959, 45, 300-301.
- 48. Lanyon, R. D., and Lanyon, R. D., "An experimental study of discrete free association to compound verbal stimuli" Psychological Review, 1957, 64, 602-603.
- 49. Lanyon, R. D., and Lanyon, R. D., "Personality variables in associative production" Journal of Experimental Psychology, 1964, 68 (2), 245-250.
- 50. Lanyon, R. D., (trans, Lanyon, R. D.), Psychological Review, New York, Harcourt Brace and Company, Inc., 1953.
- 51. Lanyon, R. D., "Relating factors between stimuli used on different individuals" Unpublished paper, University of Illinois, 1960.
- 52. Lanyon, R. D., Lanyon, R. D., and Lanyon, R. D., "The experimental dimensions of the R. D. L. Journal of Consulting Psychology", Vol. 25, (3) 1957.
- 53. Kelly, George Alexander, The psychology of personal constructs, New York, Norton, 1955.

44. Kew, John Kendall, "A comparison of some thinking processes in normal anxiety neurotics and paranoid schizophrenics", Dissertation Abstracts, 1960, (Mar.) 20 #2834
45. Kjeldergaard, Paul M., and Carroll J. B., "Two measures of free association responses and their relations to scores on selected personality and verbal ability tests," Psychological Reports, 1963, 12 (3) 667 - 670
46. Mathews, W.A., Marcer D., and Morgan E., "Word association hierarchies and free recall." Journal of Verbal Learning and Verbal Behavior. 1964 (3) 5 371 - 75.
47. Mednick, M.T., and Mednick S.A., Research in personality, New York Holt Rinehart, and Winston, 1963.
48. Milgrim, Norman A., "Microgenetic analysis of word associations in schizophrenic and brain damaged patients". Journal of Abnormal and Social Psychology, 1961, 62, 364 - 366.
49. Miller, A., and Kemp E., "Personality Style and perceptual reactivity to the immediate environment". Journal of Abnormal and Social Psychology, 1962, 65 (5) 333 - 341.
50. Myers - Briggs, I., The manual of the Myers-Briggs Type Indicator. Princeton, New Jersey, E.T.S., 1962.
51. Noble, C.E., "An analysis of meaning," Psychological Review, 1952, 59, 421 - 430.
52. Ogden, C.K. and Richards, I.A., The meaning of meaning, New York, Harcourt, Brace & Co., 1946.
53. Osgood, C.E. and Luria A., "A blind analysis of a case of multiple personality using the semantic differential". Journal of Abnormal and Social Psychology, 1954, 49 (579-591)
54. Osgood, C.E., Suci G.J., and Tannenbaum, P.H., The measurement of meaning, University of Illinois Press 1957.
55. Pavlov, I.P., Experimental psychology and other essays, New York, Philosophical Library, 1957.
56. Peters, H.N., "A multiple choice supraordinality test", Journal of Clinical Psychology, 1957, (Oct) 14, 416 - 418.
57. Pollio, Howard R., "Composition of associative clusters," Journal of Experimental Psychology, 1964, 67 (3) 199 - 288

49. Kow, John Kenneth. "A comparison of some thinking processes in normal anxiety neurasthenia and paranoid schizophrenia." Abstracts, 1963, (Mar.), 23, 283d.
50. Kjelberg, Paul W., and Carroll, J. L. "The relationship of the association response and their relation to source or selected personality and verbal ability tests." Psychological Reports, 1963, 12 (3), 667 - 670.
51. Lathams, W. L., Lathams, J., and Morgan, J. "Word association hierarchies and free recall." Journal of Experimental Psychology and Animal Behavior, 1964, 3, 271 - 7.
52. Mednick, S. L., and Mednick, S. L. "Research in personality." New York: Holt Rinehart, and Winston, 1963.
53. Milgram, Norman A. "Microgenetic analysis of word associations in schizophrenic and brain damaged patients." Journal of Abnormal and Social Psychology, 1963, 62, 351 - 366.
54. Miller, A., and Kemp, E. "Personality tests and perceptual sensitivity to the immediate environment." Journal of Abnormal and Social Psychology, 1963, 62 (2), 331 - 341.
55. Myers - Briggs, I. "The Myers - Briggs type indicator." Princeton, New Jersey, E. C. 1960.
56. Noller, C. B. "An analysis of meaning." Psychological Review, 1962, 69, 451 - 470.
57. Ogden, C. K., and Richards, I. A. "The meaning of meaning." New York: Harcourt, Brace & Co., 1946.
58. Osgood, C. E., and Turiel, A. "A clinical analysis of a case of multiple personality using the semantic differential." Journal of Abnormal and Social Psychology, 1952, 45 (2), 527 - 531.
59. Osgood, C. E., Suci, G. A., and Tannenbaum, P. H. "The measurement of meaning." University of Illinois Press, 1957.
60. Pavlov, I. P. "Experimental psychology and other essays." New York: Philosophical Library, 1927.
61. Peters, R. M. "A multiple choice authoritarianism test." Journal of Clinical Psychology, 1957, 14, 111 - 114.
62. Torgue, Howard L. "Composition of associative clusters." Journal of Experimental Psychology, 1961, 57 (3), 287 - 289.

58. Radnitsky, G.A., "Some remarks on the Whorfian hypothesis," Behavioral Science, 1961, 6 1953 - 1957.
59. Rokeach, Milton, The open and closed mind, New York, Basic Books, 1960.
60. Rosanoff, A.J., Free association test, New York, John Wiley, 1905.
61. Ross, J. "Progress report on the College Student Characteristics Study: June 1961," Research Memorandum 61-11. Princeton, N.J.: Educational Testing Service, 1961
62. Russel, W.A., and Jenkins, J. J., "The complete Minnesota norms for response to 100 words from the Kent-Rosanoff association test," Technical Report #11, 1954, University of Minnesota, Contract N 8 onr 66216.
63. Sarbin, T.R., Taft, R., Bailey, D.E., Clinical inferenic and cognitive theory, New York, Halt, Rinehart & Winston, 1960
64. Sarbin, T.R., "Anxiety: Reification of a metaphor", Archives of General Psychiatry, June 1964, Vol 10, pp 630 - 638.
65. Saunders, D.R., "Evidence bearing on use of the Myers-Briggs Type Indicator to select persons for advanced religious training: a preliminary report," Research Bulletin 57-8. Princeton, N.J. Educational Testing Service, 1957
66. Schachtel, E.G. Metamorphosis, New York, Basic Books, 1959
67. Sheppard, R.N., "Stimulus and response generalization, tests of a model relating generalization to distance in psychological space," Journal of Experimental Psychology, 1958, 55, 509 - 523.
68. Sommer, R., Dewar R., and Osmond H., "Is there a schizophrenic language?" Archives of General Psychiatry, 1960, 3, 665 - 673
69. Stricker, L.J., and Ross, J., "A description and evaluation of the Myers Briggs Type Indicator." Research Bulletin 62-6, Princeton, N.J., Educational Testing Service, 1962.
70. Terwilliger, R.F., "Free association patterns as a factor relating to semantic differential responses," Journal of Abnormal and Social Psychology, 1962, 65 (2) 87 - 94.
71. Tripodi, T., and Bieri J., "Cognitive complexity as a function of own provided constructs", Psychological Reports, 1963, 13, 26.

58. Warriner, G.A., "Some remarks on the function hypothesis,"
Behavioral Science, 1961, 6, 103-107.
59. Warriner, G.A., "The open and closed systems,"
1960.
60. Warriner, G.A., "The open and closed systems,"
1960.
61. Warriner, G.A., "The open and closed systems,"
1960.
62. Warriner, G.A., "The open and closed systems,"
1960.
63. Warriner, G.A., "The open and closed systems,"
1960.
64. Warriner, G.A., "The open and closed systems,"
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65. Warriner, G.A., "The open and closed systems,"
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66. Warriner, G.A., "The open and closed systems,"
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67. Warriner, G.A., "The open and closed systems,"
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68. Warriner, G.A., "The open and closed systems,"
1960.
69. Warriner, G.A., "The open and closed systems,"
1960.
70. Warriner, G.A., "The open and closed systems,"
1960.
71. Warriner, G.A., "The open and closed systems,"
1960.

72. Tucker, C.R., "A method for synthesis of factor analysis studies", Dept. of the Army, A.G.O., Personnel Res. Sec., Rep. #984, 1951.
73. Tulving, Endel, Subjective organization of unrelated words. Psychological Review, 1962, 69 (4) 344-354.
74. Underwood, B.J., and Schultz, R.N., Meaningfulness and verbal learning, Chicago, J.B. Lippincott Co., 1960.
75. Wallach, M.A. and Gahm, R.C., "Personality functions of graphic constriction and expansiveness," Journal of Personality, 1960, 28, 73 - 88.
76. Werner, Heinz, and Kaplan, Bernard, Symbol formation, New York, John Wiley, 1963.
77. Whitmarsh, G.A., "A comparative study of two theories of verbal generalization," Dissertation Abstracts, 1962, 22 (8) #2890.
78. Wilson, Alan B., Factor analysis package, 7090 Fortian Routine, Survey Research Center, University of California, Berkeley, 1963.
79. Winer, B.J., Statistical principles in experimental design, New York, McGraw-Hill, 1962.
80. Wrigley, C., and Neuhaus, J.O., "The matching of two sets of factors," Unpublished paper, presented to American Psychology Association, San Francisco, Sept, 1955.
81. Wyer, R.S., Jr., "A model of cognitive structure", Dissertation Abstracts 1962, 23 (6) #2237.
82. Zinner, Leon, "The consistency of human behavior in various situations, a methodological application of functional ecological psychology. Dissertation Abstracts, 1963, 24 (6) #2570.

72. Tupper, G.D., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
73. Tupper, G.D., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
74. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
75. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
76. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
77. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
78. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
79. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
80. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
81. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.
82. Underwood, B.J., and Woodworth, R.S., "The effect of the level of the stimulus on the response," Psychological Review, 1931, 38, 1-10.

WORD ASSOCIATION TEST

Directions:

Following is a list of words numbered from 1-33. A stimulus word (one of the words in the list) will be presented on a card at the front of the room for approximately one minute. You are to select any other word from the list that you consider to be the most strongly associated with the stimulus word. Don't look at your neighbor's answer.

Indicate the number of the stimulus word beside your chosen strongest association in the space provided.

e.g. 1. blue ___
 2. sky ___
 3. bird 1
 4. black ___
 5. beard ___

If the word blue is presented (stimulus) and your strongest association is bird, indicate a 1 in the space to the right of bird.

- | | | | |
|------------------|-------|-----------------|-------|
| 1. pain | _____ | 18. dances | _____ |
| 2. food | _____ | 19. decency | _____ |
| 3. papers | _____ | 20. boredom | _____ |
| 4. nervousness | _____ | 21. hunger | _____ |
| 5. discussions | _____ | 22. landscape | _____ |
| 6. paintings | _____ | 23. studies | _____ |
| 7. university | _____ | 24. confusion | _____ |
| 8. trees | _____ | 25. lectures | _____ |
| 9. thought | _____ | 26. scholarship | _____ |
| 10. frustration | _____ | 27. anxiety | _____ |
| 11. sidewalks | _____ | 28. books | _____ |
| 12. flowers | _____ | 29. sports | _____ |
| 13. cars | _____ | 30. buildings | _____ |
| 14. people | _____ | 31. sky | _____ |
| 15. morality | _____ | 32. nausea | _____ |
| 16. architecture | _____ | 33. Passion | _____ |
| 17. drinks | _____ | | |

